

Aide-de-Camp's Library



सत्यमेव जयते

Rashtrapati Bhavan
New Delhi

Accn. No. 1241

Call No. VIII (d) - 5



Aide-de-Camp's Library

•

WISDOM IN THE WILD

•

By the Same Author

DARTMOOR IN ALL ITS MOODS
FIELD PHILOSOPHY

WISDOM IN THE WILD

By DOUGLAS GORDON

LONDON

JOHN MURRAY, ALBEMARLE STREET, W.

First Edition . . . 1934

CONTENTS

	PAGE
AUTHOR'S NOTE	vii
FOREWORD	ix
CHAPTER	
I THE WILD CREATURE'S ATTITUDE TOWARDS MANKIND	I
II AFFECTION	27
III RELATIONSHIP	44
IV THE HIGHER QUALITIES IN ANIMAL NATURE	63
V ANIMOSITY	78
VI FRIENDSHIP	98
VII CO-OPERATION	111
VIII LANGUAGE	135
IX ADAPTABILITY	156
X REACTION TO EMERGENCY	181
XI STRATEGY	208
XII ORIENTATION AND MIGRATION	235
XIII VISION	261
XIV THE MIND OF THE WILD CRAFTSMAN	278
XV LIMITATIONS	308

AUTHOR'S NOTE

THE object of this book is to present the animal outlook from the standpoint that seems compatible with its way of life, without necessarily conforming to any existing theory or school of thought, although certain conclusions reached may be corroborated in the main by modern scientific research, since there are many ways of arriving at a common end.

In view of possible misrepresentation, I should like to disclaim all sympathy with various practices to which reference is unavoidably made. With regard to the spring-trap in particular, my attitude has been emphatically declared in a previous work, *Field Philosophy*. Since trapping is regrettably upon the increase rather than otherwise, its effects upon wild life present many problems which are rendered none the less interesting by the deplorable character of the system.

In conclusion, one might express the hope that the successful campaign carried out against the caged bird traffic may provide a precedent

in other directions, and particularly with regard to the gin, in the use, or rather the abuse of which, reform was never more sorely needed.

DOUGLAS GORDON.

STICKLEPATH,

DEVON.

January 23rd, 1934.

FOREWORD

IN this world there is nothing more remarkable than identity—a subject upon which comparatively little thought is bestowed, partly upon account of its magnitude, partly because, like the very existence of the universe, it is taken for granted. This idea has doubtless occurred at some time to the minds of most people when observing the movements of some vast crowd, and reflecting that each individual of the many thousands who form that great assembly possesses a distinct personality ; that each has his own secret thoughts, desires and eccentricities ; that each regards the numberless problems of life from a standpoint of his own ; that each has his own niche in the world at large and that the identity of everyone, irrespective of race, age or class is *unique*.

This is a big thought when applied solely to humanity, but when one remembers that it is equally true of the entire natural kingdom, “wild beasts and creeping things and fowls of the air,” it becomes almost too stupendous for conception if seriously considered. With the most insignificant insect crushed beneath the “inadvertent step” there perishes something

that has never before existed and is entirely irreplaceable, since in its minute form there was contained a priceless spark of that mysterious quantity called "life", which in reality is identity.

To destroy life is easy, to restore it impossible, nor can it be quickened in anything that lacks the essential principle. It is the secret of motion, volition—being. Without it all is changed although the conditions under which it flourished remain unaltered. Deprive a growing plant of life by means of some lethal injection and note the result. The earth in which it was rooted remains the same ; the sun still shines ; other vegetation continues to bloom around, but the stricken plant responds no more to beneficent influences. Its growth has ceased ; its colour fades ; it droops and withers where it stands, quickly losing all resemblance to the healthy, lusty thing that flourished so short a while before.

The same principle applies to any form of life whether animal or vegetable. When deprived of that force by which all its movements are actuated and dominated and which natural processes alone can impart, the body that it animated is reduced to a mere shell—waste matter which may be preserved in certain forms by artificial means, but never again revitalized.

Thus in every creature the mystery of existence

upon this planet and of physical life from the particular standpoint that the animal occupies is enacted anew. Each bird or beast embarks upon its course afresh as might the first of its kind with this sole difference—that it is equipped with a measure of knowledge transmitted through the living sperm from which its existence is derived. Apart from this and its own ability to transfer the same, together with any additional knowledge that it may accumulate, to succeeding generations, there is nothing to connect its term of life with the past or the future. Its actual work in certain spheres of activity may survive it, since a bird is capable of planting a tree destined to stand for centuries, but so far as the individual is concerned, every dog has his day—no more.

That day may be long or short according to circumstance, but it is the creature's own, to utilize to the best advantage that its lot permits. Within it, if allowed the full period that Nature grants, it will not only fulfil the purpose of its existence, pursuing its natural desires and claiming all that life can offer, but it will also develop and employ the various personal characteristics and peculiarities of temperament and disposition that belong to itself alone, and which more than anything else serve to distinguish it from all others of its kind since the world began.

Needless to say, outstanding characters are the exception rather than the rule, prodigies of

any kind being as rare in the furred and feathered world as in all walks of life, while so far as wild creatures are concerned, more often than not the bird or beast lives and dies without displaying any qualities or tendencies to distinguish it from its fellows. The charm and interest afforded by the few individuals that reveal themselves to mankind go far to illustrate the possibilities that perish with the vast majority that remain unknown.

Animal psychology will always provide matter for controversy. Before embarking upon the subject, however, it is essential to bear one point in mind. "There is one kind of flesh of men, another flesh of beasts, another of fishes, and another of birds," and the ancient truism applies equally to mental distinctions. That beast, bird, fish and insect one and all possess body and mind within the restrictions imposed by nature is indubitable. It is none the less certain, however, that their ways are not our ways, nor their thoughts our thoughts.

The latter point has been repeatedly emphasized throughout this book, since it serves, if not altogether to elucidate, at least to render less incomprehensible many situations in the animal kingdom that are quite unaccountable when judged from the human standpoint.

CHAPTER I

THE WILD CREATURE'S ATTITUDE TOWARDS MANKIND

IN the folk-lore of the North American Indians there may be found frequent references to a vanished era when all living things existed in perfect amity, when hardship and suffering were unknown, when Winter had never invaded the North, and "nobody ate anybody". In picturesque fiction of comparatively modern days one finds the germ of the same idea, while even in ancient Biblical prophecy there is reference to a time when the lion and the lamb shall fraternize, and "they shall not hurt nor destroy".

At first glance this might be regarded as an invasion into the realms of fantasy, but, even when reverting to cold reality, it is sufficiently clear that a new spirit is abroad in the world. As yet it is merely in its infancy, but there are unmistakable signs of a wider sympathy, together with a more comprehensive sense of responsibility towards wild life in general. It is significant that at the moment of writing an International Conference is sitting in London, having for its object the more adequate conservation of Africa's fauna, while a leading newspaper,

reporting upon the session, speaks of the growing reluctance upon the part of sportsmen to kill the nobler species of game for no other motive than sheer love of destruction. True, we are far from the millennium as yet, even assuming that so ideal a state is compatible with the present scheme of life upon this planet. One cannot but think, however, that in the general outlook upon Nature, the steps of Progress, though wavering at times, incline for the most part in the right direction. That effort will be uselessly expended in the pursuit of ideals neither possible nor desirable is inevitable. It is none the less probable, however, that the present century will witness a wide revision of outlook in many fields of sport and Natural History study.

In all human affairs, whether public or private, lack of adequate perception constitutes, perhaps, the most detrimental factor, and this applies particularly to the relations that exist between mankind and the wild creatures. Given upon the one part a fuller realization of responsibility, upon the other a shrewder discrimination and sense of consequence, the main difficulties that to-day confront those who strive for the preservation of wild bird or beast would disappear automatically. If the wild creature only possessed sufficient acumen to distinguish between friend and foe, even to the limited extent of recognizing protection when afforded, there

would be no further occasion for campaign or appeal, since the army of wild bird protectors is steadily gaining in strength. How much distress, again, a parent bird might be spared in the breeding season, could it but distinguish the interested observer or the benevolent neutral who merely enters its domain, from the enemy intent upon robbery or destruction.

Poor bird! [wrote W. H. Hudson of the lapwing that followed him with its customary plaint]. Is there no way to make you understand . . . that your black-spotted, olive-coloured eggs are perfectly safe ; that a man can walk about on the heath and be no more harmful to you than the Forest ponies, and the ragged donkey browsing on a furze-bush, and the cow with her tinkling bell ?

This same sentiment has been expressed by many naturalists before and since, for not only might the bird spare itself much anguish of soul, but it might afford keen pleasure to the would-be observer, could it only appreciate the friendliness of his intentions. The circumstance is rendered all the more pathetic by the fact that not only do birds distress themselves unnecessarily, and deny their friends, but they go far upon the road towards betraying the very information that they wish to guard.

The same suicidal tactics are adopted in some form or other by the majority of species, from the great robber birds of the mountains to the bright little redshank that nests upon the Essex Saltings within a short run of the Metropolis.

It was one of these latter birds, indeed, that provided the most recent illustration of this extraordinary tendency to attract the notice of, rather than shun the passer-by during this highly critical period. The birds concerned were nesting upon a salt marsh not far from Colchester. The place was intersected by a maze of causeways along which people continually passed, and the birds who had chicks concealed in some long grass near one of the sea-walls, were kept in perpetual motion and outcry. Each intruder constituted in their opinion an individual menace, although not one, so far as could be seen, bestowed the slightest attention upon the birds and their affairs, until at last importunity brought about the inevitable consequence in the form of search and discovery.

It seems curious that, in this respect at any rate, hard experience all down the generations has failed to evolve tactics more adequate to serve the purpose of racial protection. Since silence and effacement would so obviously constitute a far safer and easier course, one might reasonably have expected the avian race to have acquired the necessary instinct long ago. Presumably, since the tactics appear to succeed in many cases, the majority of intruders merely treating the commotion with indifference, the fallacy of the policy as a whole has never been brought home. This is the more remarkable in view of the fact that birds of the same order as

the species named have discovered the value of secrecy so far as the actual position of the nest is concerned, observing every precaution when quitting or returning to the spot. Wonder may therefore be entertained that the golden rule of silence is not more logically pursued. It would be time enough for direct action in the form of outcry and artifice were the nest or young actually approached. The mental limitations of the avian race could scarcely be more forcibly illustrated.†

This attitude, it should be remarked, is not necessarily the outcome of long persecution at the hands of man, although the species in question may have suffered considerably in this respect. Speaking from personal experience, the most foolish—if one may use the expression—exhibition of the kind ever witnessed was provided by a bird into whose nest no human eye had ever looked. The specimen concerned was a North American crow, resident in a district where *homo sapiens* was still practically unknown, and the circumstance was rendered the more interesting by the fact that the British crow is one of the few birds that seldom, or never, observes such tactics against an intruder. Whether in the latter case the caution is the outcome of experience or a purely natural trait, is a moot point. Experience does not necessarily bring wisdom even to the most intelligent. No bird displays a more complete lack of discretion in

this respect than the eminently sagacious raven ; no bird such a shrewdly calculated degree of secrecy as the comparatively simple jay.

That certain birds have learned to distinguish between man and other enemies, so far, at least, as to cultivate different tactics in his case, is tolerably certain. The difference, however, is only relative to the greater degree of fear that the "human element" inspires. Man, for the most part, they treat more respectfully, as though aware of his ability to hurt from afar, and for that matter, indeed, their methods of defence vary considerably with the character of any enemy with whom they have to contend. Upon the latter point an observer may usually obtain the necessary information from the behaviour of the birds concerned. When danger is apprehended from a falcon they usually take cover and are silent. A furred enemy, such as a fox or cat, is hailed with noisy denunciation and closely attended as long as visible. An owl, being helpless by day, is always mobbed, while a sparrowhawk—until it turns aggressor—is treated in a similar manner. Man alone, excepting during the breeding season, is given a clear field, and general precipitate flight from any given locality may usually be attributed to human agency.

For this reason it seems the more extraordinary that during the important period of nesting-time birds should so completely lose this sense of discrimination. The stereotyped answer that in-

instinctive protection supersedes fear scarcely suffices, since instinct makes as a rule for the preservation of species, which latter end is not achieved by the substitution of an imaginary danger for a real one. All considered, it would appear to provide a forcible proof of the influence still exercised upon the animal by primitive law in all matters essentially and fundamentally natural. The breeding season is eminently the time when animal nature responds to impulses and emotions that are, above all, primitive. For the time being it owns no guide but Nature whose precedence remains immutable through all the changes time has wrought, and her children still obey the laws that prevailed before human intellect revolutionized the entire order of the world. While the bird remains under the influence of the season and its emotions man is no longer the dread being before whom everything must flee. He becomes, as he was at the beginning of time, merely a predatory monster, a rapacious creature, to be decoyed, like any other beast of prey, by simple methods that still prove efficacious enough against natural enemies with which the bird's mentality is capable of coping.

Upon normal occasions it is sufficiently clear that animals recognize the physical rather than the intellectual difference between mankind and other enemies. Moreover, they discover his limitations in the former capacity without learn-

ing his superiority in the later, and thus frequently fail to utilize the advantages that they might otherwise derive from speed of limb or wing power. Inevitably, it is the proximity of man that is feared the most, for every wild creature has its own idea of a safety margin based upon the experience of its race. A rabbit slackens pace when a hundred yards from the gun ; a fox or a deer when a mile of country lies between himself and his pursuers. The November partridge, like the woodpigeon, usually vacates a field as the sportsman enters it, the distance in each case being that which the animal has learned to regard as representing immunity from actual danger.

This dread of proximity not infrequently proves the animal's undoing when otherwise it would escape unscathed. In the course of a batue it is not unusual for a squatting game-bird or rabbit to permit a beater to pass within a few feet of its hiding-place, only to betray itself by bursting into flight when the enemy is actually farther away and the danger over. In all probability, until that moment, the animal, crouching low in its covert, confused by the noise and vibration upon all sides, and staking everything upon the chances of concealment, had not caught sight of the enemy advancing from behind. When the latter crosses the field of its vision, however, even though actually receding, either the sense of proximity becomes

too acute, or the animal, itself seeing, and therefore assuming itself to be seen, can endure the strain no longer.

Above all else, perhaps, the wild creature fears and dislikes the *attention* of man. This is apparent even in the case of birds accustomed to the near neighbourhood of human beings. Select any gull upon the shore and focus field-glasses upon it. Scores of people may be near, but the bird no sooner realizes that it has become the object of special notice than it exhibits signs of uneasiness. It casts apprehensive glances to right and left, shifts its position, and if the scrutiny is maintained soon takes to flight. It is the case with all animals. Birds or rabbits feeding upon the fields disregard the passer-by until the latter evinces interest in their doings. Even if no attempt is made at direct approach, they withdraw to a greater distance. Deer, though semi-domesticated, retire from a stranger who observes them too closely, while the predisposition upon the part of small birds to take cover when watched is not entirely accidental. Upon such occasions they evince no sign of actual alarm. They merely become uneasy, for in their scheme of things there is no such thing as interest without ulterior motive. About the doings of one another animals care nothing, unless themselves affected. Enmity or tacit neutrality is the rule. Direct attention involves intention—usually to kill, invariably to molest, and is suspected accordingly.

For an example, one has only to watch a dog when crossing a field that contains cattle. The chances are that the intruder will soon attract the gaze of the occupants, and the dog no sooner realizes that eyes are upon him than he retreats in the direction of his owner. He recognizes that attention will soon be followed by active demonstration—its one conceivable outcome, according to his lights.

It is owing to this somewhat unfortunate trait of animal nature that the would-be befriender of wild life so often defeats his own ends. Only as the result of experience purchased at the cost of frequent disappointment does one reluctantly arrive at the conclusion that the one course of action appreciated by the wild creature is scrupulous disregard of its existence. From the animal's point of view there is little to choose between active molestation and constant supervision, when the latter involves anything in the way of intrusion upon the privacy that it values above all else. Good offices are not appreciated, unless tendered in such a manner as to be unrecognizable in the character of interference. Of friendliness in the ordinary sense it has no conception. If one placed food for a wild animal, and it was aware of the act, it would probably suspect trickery. If unaware of any such intention, the fare would probably be accepted, if palatable, the creature imagining that it was wresting booty from a rival's store.

Upon the same principle, a bird rescued from the very talons of a hawk, or a leveret removed from under the hay-knives which would have decimated it, cherishes no gratitude towards its deliverer. Upon the contrary, it doubtless congratulates itself upon escape—as it supposes—not only from the frying-pan but also from the fire. Like the Lilliputian when released by Gulliver, it departs without wasting time or breath upon thanks.

Would-be protectors of birds and beasts frequently express distress that the animals concerned so seldom avail themselves of the sanctuary offered. For this there may be many reasons which will be dealt with in subsequent chapters. One direct and very common cause, however, is that already mentioned—too frequent disturbance. Anyone who takes pride in the wild life upon his estate is naturally anxious to enjoy the full advantages of the opportunities provided for observation. He may not be able to resist the temptation to experiment, and there will almost certainly be interested friends—probably with cameras. It is difficult to realize that the animal finds disturbance for inspection quite as alarming as actual attempt at destruction. It recognizes no distinction, and far from regarding the place as one of safety, its impressions are rather those of constant danger and interference. The man who really desires to encourage interesting creatures upon his land is

most likely to achieve success if he denies himself the pleasure of studying them at close quarters.

This same principle applies to the accidental discovery of the nesting place of almost any wild animal. It is not easy for anyone, and particularly a keen naturalist, to refrain from examining the home or young of some shy inhabitant of the hedgerows. The inspection is sympathetic, but the effect may be disastrous, and even fatal, to the little family whose privacy has been violated. The proceeding in all probability involves a premature dissolution of the party, or—even worse in the case of very young creatures—the desertion of the brood by the parent. A wild rabbit, for example, is supposed never to return to a nesting-burrow the covering earth of which has been even slightly disturbed by human agency, while a squirrel, weasel or mouse would probably destroy offspring that human hands had touched. Birds are liable to disperse before actually fit to quit the nest, while a new foot-scent near her earth may provoke the jealous vixen to remove her cubs to some distant hiding-place.

One may take it for granted that any action even remotely constituting or construable into interference with the secrets of an animal's life is regarded as a hostile act. The bird or beast enjoys no sense of security unless under the impression that its presence is either unnoticed or unknown. To realize the protection of man,

or to regard him in the light of a benefactor, would seem in the great majority of instances to be impossible. The warfare between humanity and the furred or feathered races has been too bitter, too prolonged. To this rule there are inevitable exceptions. One has only to think of the bird life in city parks or upon the sea shore, where the wild gulls not only evince no fear of crowds, but even approach to within a few feet of picnic parties or fishermen in boats for scraps of any kind. These birds, however, are trading upon knowledge accumulated through countless generations, having acquired an outlook akin to that of a domestic fowl. They have come to regard the human element at certain prescribed spots as not only harmless, but even constituting a valuable source of supply. Even in this connection, however, there are significant reservations. In the first instance the confiding attitude of the birds is confined to certain species. Those which approach the picnic party upon the shore, or walk unmoved upon the crowded quay where fishing-boats unload, consist almost entirely of gulls of the common varieties, which, since time immemorial, have derived a considerable part of their livelihood from the fisherman's wastage. The jackdaw is usually equally grateful for leavings, but he waits until the coast is clear before swooping down to help himself. As for other birds of the shore, they leave the human element severely

alone. Upon the cliffs above, the rock-pipit, meadow-pipit, linnet and wheatear may be in evidence, but though doubtless equally capable of relishing crumbs, they refrain from gratifying such tastes. Behind them there is no long history of ancestors regaled from the rich man's table, and it is taken for granted that they will keep their distance. Members of the luncheon party, if they bestowed a thought upon the matter, would probably remark that such birds are more timid than the gulls, and the naturalist would certainly open his eyes were the grey-plumed band of hope that watched the demolition of his sandwiches reinforced by as many oyster-catchers, whimbrels, or sanderlings.

Even more significant is the second reservation. If one left the populous parts of the shore and established oneself at some lonely point to which the crowd never penetrated, one could eat many meals in tolerable certainty that not a gull of any variety would approach within reasonable distance. Yet the very birds that at other times fearlessly solicit scraps upon the crowded beach may be at their nesting-places not a hundred yards away. Now, however, there is nothing confiding about their attitude. The solitary figure upon the shore is regarded with unqualified suspicion, as evidenced by the angry cries and incessant circlings overhead.

The reason for this change of front is not hard to seek. The human being has left the

charmed circle of the neutral zone, the ground upon which man and bird meet without hostility, in an atmosphere of breadcrumbs and fragments of fish. At the foot of the lonely cliff he assumes a different character. There, normal relations are restored, natural animosity revived. Man comes as often as not with gun in hand, or intent upon some raid. He is once again the disturbing element, probably of a species altogether distinct from the profitable crowd upon the beach.

It would almost appear at times that animals seek the protection of mankind when in dire extremity. Hunted beasts have not infrequently entered houses. Most people have read Sir Percy Fitzpatrick's account of the impala ewe which dashed into the camp-fire circle with the wild dogs at her heels, while everyone will be able to recall some occasion upon which a domesticated animal has most unquestionably solicited aid when in distress. It is, perhaps, superfluous to remark, however, that the domesticated creature is in many definite respects differently situated from its untamed representatives. It seems sufficiently obvious, moreover, that when a wild animal adopts such a course the proceeding is largely accidental. When a hunted fox seeks refuge among human habitations, it means that the animal has been reduced to such a pass that it would avail itself of any shelter that offered. It has vainly employed

all its natural resources ; its last line of defence has been exhausted ; it is merely running blindly ahead, and in all probability is not even aware of houses until among them. One can scarcely suppose that the finch which dashes through the open window when almost within the grasp of the pursuing hawk, bestows a thought upon the nature of the sanctuary that it seeks, any more than the impala already mentioned as much as noticed the camp-fire, or the rabbit with the stoat in close attendance sees the human being towards whom it runs. In each case the animal is obsessed with one idea—that of the danger behind—and unless in the last stages of exhaustion, provides speedy evidence that it realizes its mistake. When the latter is discovered, the animal usually flees far faster from the two-legged terror than it fled from its natural enemy, while in the case of a creature that is being hunted by human agency, the idea that it would deliberately seek refuge with man from man seems sufficiently incongruous.

It would be interesting could one with any degree of certainty define the mental attitude in which birds approach human habitation during hard weather. Presumably, they come for the cogent reasons that natural supplies have failed ; because no food is obtainable elsewhere, and hunger makes birds also bold. But in what light, one wonders, do the wilder species regard

the provisions set out upon window-ledge or bird-table? Possibly, they accept the "gifts the gods provide", and in the deep wisdom of their extreme simplicity trouble their unfathomable minds with no questions as to the why and wherefore. If they bestow any thought upon the problem, they might conceivably cherish the belief that the banquet grows naturally, like garden or field produce, and is always there for the taking. In all likelihood, they regard it as they would newly-sown seed, to which each comer may help himself—at his own risk. The human being who scatters the bread crumbs would be synonymous with the agriculturist who sows and subsequently protects his seed, and each appearance of their benefactor at the window or in the garden is hailed in the light of a sortie for purposes of salvage or vengeance. In course of time the tamer species come to look upon the dispenser of provender in the same manner as rooks and gulls regard a ploughman or fisherman—a harmless adjunct, if treated with due respect, and connected somehow with the sudden appearance of the food supply. Even so, the greater number accept human bounty of necessity rather than choice, and voluntarily surrender this source of supply when their natural way of life is again open to them.

It has been a matter of discussion as to whether the fear of man is imparted to young animals

by their parents, or is acquired as the outcome of experience. When the question is viewed from every standpoint, however, there can be little real doubt that it is neither imparted nor acquired, but inherent. It develops with the wild creatures physical growth, like its faculties and senses. It is true that a very young bird in the nest, like a little cub whose eyes are barely opened, meets the gaze of the human monster without a trace of alarm. But that same little animal, it should be emphasized, cannot fly, run, or in any way preserve itself from the danger that it lacks the intelligence to appreciate. It does not acquire a sense of possible peril until it has also developed some means of combating the fate that threatens it. A nestling one day old opens its mouth at the finger advanced towards it. So far as the young bird is concerned, there is nothing to distinguish the intruder from its parent bringing food. A week later it cowers flat in the nest or lies on its back "shamming" death. A few days more, and it flutters away at the stranger's approach. It has learned fear, one might be inclined to remark. And so at first glance it may seem, until one considers the case of those species that are more highly developed at birth; the young of the ground-nesting birds that are nimble pedestrians from the moment they chip shell. When uncovered for the first time from the shelter of their mother's wings—that mother unwillingly driven from her post by the approach-

ing footfall—the newly-hatched chicks evince a very lively fear of the giant who now bends over them. Trickling, as it would almost seem, actually from the still moist shells clustered about them, like discarded overcoats, they vanish from the gaze that was friendly enough had they but known it, and the rapidity and skill with which they conceal themselves amongst the dry grass or leaves dispose of any question as to their views upon the matter. Yet these birds are even younger than those nestlings which under precisely similar circumstances open their mouths—at perhaps the same intruder—from the nursery in a bush only a short distance away. Younger they may be in actual age, but they are far more advanced in physical ability, and in consequence are fully acquainted with fear.

There can be little doubt that fear is mainly a product of the wild state, developing under wild conditions. When birds are taken from the nest so young that they have not yet learned to distinguish the natural from the captive state, much of their inherent timidity is counteracted, even as the early and natural tendencies of a young child may be checked during infancy. Rather, perhaps, it remains dormant as long as the influence that counteracts it is maintained, for a tame animal of wild stock, if given its liberty at any period of life, quickly reverts to its natural attitude towards mankind, although

it retains a measure of boldness as a matter of course.

To win the confidence of a wild bird is no easy matter, requiring the expenditure of almost unlimited time and patience. It is doubtful whether some species would ever respond to advances, the way to their suspicious little hearts being too obscure. Others are by disposition more confiding, and being more sociably inclined, react the more readily. This tendency runs not only in species but in strains, and while little headway can be made with certain individuals, others may be described as being more than half tame from birth, so requiring but little encouragement.

Some two years ago, when walking round the garden, my attention was arrested by the behaviour of a young robin who not only evinced an extraordinary partiality for human society, but whose offers of assistance in subsequent active operations among the flower-beds were insistent enough to become embarrassing. His interest in the proceedings grew so keen that he stood in constant danger from any tool that was in use, and when he pursued the acquaintance to the extent of perching upon my knee—only the second time within personal experience that a wild bird has displayed such temerity—the utmost limit of even a robin's friendliness appeared to have been reached.

Better was to follow, however. Within a day

or two this most engaging little bird was not only feeding readily from the hand, but actually coming to call with all the alacrity and fearlessness of a domesticated pet. Now after the lapse of nearly thirty months he remains a household institution, and it is an easy matter to summon him to any window within a few seconds.

Taming garden birds as a general rule presents no insuperable difficulty, but involves the exercise of considerable tact. They are almost invariably shy of first advances, suspicious of any new departure, and are quick to take alarm at the slightest movement. This robin, upon the contrary, seems to be entirely devoid of fear, the keynote of his attitude towards any human beings upon the premises being that of implicit confidence in their benevolence.

Incidentally, tameness among several species of birds was a feature of that particular season. In such cases, is there, one wonders, some natural reason for their behaviour? It is quite conceivable that they are in truth hungry, owing, perhaps, to shortage in some source of supply unknown to the ornithologist; or it may possibly be due to a physical weakness consequent upon a peculiarity of the climatic conditions. For some unaccountable reason, injured animals, or those in failing health, appear to lose their timidity before any other quality. It is common knowledge that a carnivorous beast, when mangy or lame, is more dangerous than a sound animal.

This is attributed, and quite rightly up to a certain point, to inability upon the animal's part to obtain a livelihood in the customary way. An almost equally common cause for its boldness, however, lies in loss of fear as its faculties decline. An animal in ill health is also frequently afflicted with restlessness due to discomfort, which causes it to wander about at times when it would otherwise efface itself, or in places which, normally, it would avoid. When a rat or a mouse, to adopt a homely simile, develops the habit of repeatedly displaying itself in occupied premises during daylight, there is usually an abnormal reason—in most cases some acute disease—for its behaviour. The gist of the matter probably is that in such cases the animal's senses are dulled, and it is less conscious of outside influences than when in full possession of its faculties.

Some years ago a family of hedgehogs was brought in from a hayfield. They had been taken, literally, from under the knives, by which the mother had obviously been wounded. She appeared to be in no way incommoded by the accident, however. She ate her food with avidity, and was in every sense more amenable to captivity than any of her young ones, which, being little bigger than tennis-balls, might have been expected to adapt themselves to changed conditions more readily than the parent. The reverse was the case, however. When meals

were brought, the little ones scuttled into the darkest corner of their enclosure, curled up, and there remained until the coast was clear. Not so the mother. She was usually asleep when the bread and milk arrived, but at the depositing of the dish she immediately unrolled and sallied forth to feed, with all the confidence of a little farmyard pig. After the first day she emerged from the straw regularly when summoned, and this continued for about a fortnight—the critical period with injured animals—then she died. Her young, one of which lived in the garden in a state of semi-freedom for some years, never attained her degree of tameness. The famous Johnny Bear, it must be remembered, was a cripple, and short-lived.

When endeavouring to cultivate the acquaintance of a wild creature, particularly if it happens to be an adult, it is usually advisable to make no attempt at actual physical contact. The majority of animals keenly resent touch, as in their eyes it constitutes an infringement of personal liberty. Few reach so complete a state of self-surrender as to submit to handling. Indeed, there is no surer way of destroying confidence. In the natural state, it must be remembered, an animal is *caught* by another of a different species for one purpose only, and every natural instinct is therefore violated by the proceeding. It is noteworthy that the robin already described undoubtedly dislikes even the

touch of human flesh beneath its feet. It will alight fearlessly upon the bare hand to take food, but seldom remains there a second longer than is positively necessary. In direct contrast to this form of shyness, it will remain perched for an indefinite period upon the knee or shoulder, or any part of a human body that is covered by clothes. The distinction is too obvious and has been too frequently proved to admit of any other construction.

In the actual taming process individuality of temperament must, of course, play a large part, and while some creatures respond readily from the outset, others remain intractable to the end. One might quote the case of a common house-sparrow, one of four reared from the nest and subsequently released, which alone retained any affection for those who were responsible for his upbringing. When liberated, the other three were seen no more. This one bird, however, returned regularly to be fed, flying in and out of the windows and about the house with the freedom of a canary, but otherwise living the life of an ordinary wild sparrow, mating and rearing a brood each year, and continuing his dual existence for several seasons, until a rain-storm of exceptional severity, coinciding with his disappearance, left little doubt as to his end.

This bird differed from the robin previously described in that it was hand-reared. That the latter bird is possessed of abnormal character-

istics cannot be doubted, and whatever the natural reasons—if any—for his conduct, his case presents an interesting psychological problem. There are, unfortunately, no means of ascertaining the means by which he, above others of his kind, acquired so peculiarly confiding a nature. Most remarkable of all, perhaps, is his aptitude for coming to a call. With no inherited knowledge or instincts to aid him, how was he enabled so quickly to realize that a particular word or note was intended as an individual summons to himself? Like the sparrow, he leads a double life, disappearing completely each year in the spring for a period approximating to four months, after which he regularly returns accompanied by a family. The young are not reared upon the premises, nor has one any idea as to the distance they are brought. Within a few days they disperse, and the parent resumes normal relations with the household as though there had been no break in the unusual connection.

What, one wonders, are the precise mental processes by which the memory of this association is kept alive during the highly emotional and arduous experience of reproduction? One would like to imagine the little absentee, even while engrossed in its own pressing affairs, retaining pleasant recollections of its human friends, and looking forward to the time when, duty accomplished, the connection might be renewed. Against this, however, one is confronted with

the less flattering, but far more probable supposition that it is merely a case of out of sight out of mind ; that memory is revived at last by association when the normal course of life is resumed, or, that the demands made by the growing appetites of the family recall to mind an unfailing source of supply.

In bird nature, however, lies bird charm, even as the most attractive characteristics in a human being are those which seem eminently consistent with age or sex. Nobody desires the normal child to be a paragon of virtue, nor would qualities that are the outcome of human intelligence be in any sense becoming to bird or beast.

CHAPTER II

AFFECTION

THE family side of wild animal life, that is to say, the relations that exist between parent and young or between mated pairs, is a subject about which comparatively little can be actually known. As a general rule, conventional ideas in this connection are based mainly upon surmise, since the human observer is rarely in a position to obtain any real insight into the emotions of the bird or beast. Few subjects appeal more strongly to human imagination than the solicitous care of the animal for its offspring, and it is inevitable that numerous conclusions should be based upon our own standards, since in many respects the wild parent closely resembles its human representative, and it is only after long study that one realizes the points of difference which in reality are more significant than those of resemblance.

The "love" of a wild parent—if so, indeed, it may be termed, can only be described as "natural affection", and the expression contains its own apt definition, being a quality essentially physical, the outcome of purely natural processes, surviving as long and no longer than

is required to serve a natural and physical purpose. It is, in truth, the assertion of a powerful though transitory instinct, and throughout the brief period of its duration no human parent ever displayed more self-sacrificing devotion than that evinced every day by the most common bird of the hedgerow towards its helpless charges. And certainly no parent of the human race ever lost his or her affection so suddenly and completely as does that same bird when it realizes that its good offices are no longer necessary.

Such early curtailment of family affection is obviously essential, otherwise Nature's scheme would be frustrated at every turn. In the natural order of events provision must be made for the species rather than for the individual. A brood that comes to grief must be replaced without delay, and life is too short and tragedy always too near in the wild to allow for sentiment. Were the parent's affections permanently centred upon one brood, its loss, whether by the natural processes of growth and consequent independence, or through fatal mischance, would be mourned too long and too deeply for Nature's purpose. A state of perpetual sorrow would replace the "gladsome life" that forms an integral part of the wild heritage, and thus in this seeming callousness of the animal's disposition lies its one sure road to individual happiness and racial prosperity.

Indeed, any tendency towards indefinite or

prolonged sorrow upon the part of a bereaved creature would do little more than defeat the main purpose of its existence. The bird that loses one of its brood for the moment evinces a marked and undoubtedly genuine distress. There is no reason, however, for supposing that such emotions are anything more than temporary. For the fate of the nestling whose end it has witnessed it experiences certainly a "natural" grief, probably not unmixed with resentment. Its instinct to protect or cherish has been frustrated, outraged, and for an hour or two after the tragedy, or until its attention has been distracted by some fresh diversion, it will continue intermittently to lament, breaking forth now and again into vocal protest, like a human being still sore from some newly encountered grievance.

Happily, however, the memory of the bird is short. The instinct to tend the surviving family reasserts itself, and within a brief space of time it has probably forgotten the entire incident. The lost nestling possessed no individuality, so far as the parent was concerned, and had its fate not been witnessed, it would never have been missed from the nursery.

No observer has ever yet noted any sign of distress upon the part of the mother bird for the loss of nestlings ejected by the alien cuckoo. Upon the contrary, the young birds appear to lose their identity from the moment of their eviction, and the case of the laggard who re-

mains in the nest after his stronger or bolder fellows have taken their departure appears to be much the same. The mother bestows upon him, at best, grudging attention, and, but for his disconsolate pipings, would probably ignore him altogether. Her natural inclination is to follow and attend to the needs of the other fledglings who have embarked upon active life, as young birds should at the approved time. Her instincts operate for the safeguarding of the normal, making no provision for the abnormal, as being outside the case. This seems to constitute a clear provision to ensure uniformity and avert chaos.

It seems obvious that a bird can entertain no actual attachment for eggs, or it would not forsake them so readily. When incubation is well advanced, a clutch that has *perceptibly* dwindled is, as a rule, abandoned, while certain birds, of which the jay constitutes a British example, are accused of demolishing eggs that have been viewed by alien eyes. Proof positive as to this tendency is difficult to obtain, but personal experience can testify to the discovery of a jay's clutch, warm and intact when first found, sucked dry a few days later. Whether in this case the lawful owner or some enemy were responsible for the outrage was an open question. The manner of the work, however, suggested a bird rather than a weasel.

Assuming the instance to have been one of

cannibalism, one can only suppose that jealousy constituted the motive. An assertion of the same instinct, although in a modified form, would serve to account for the forsaken clutch, or nest from which the clutch has been removed. Otherwise, there is no apparent reason why the same nest should not serve for a second venture. The possible suggestion that the mere knowledge of *discovery* might cause desertion, seems scarcely sufficient, since inspection is not necessarily attended by disastrous consequences unless there is evidence of actual despoilation. It may be that association with disaster forbids the renewed use of the nest that had been raided, but this consideration in no way deters the bird from building again in the immediate vicinity.

In one respect the instinct to abandon a depleted clutch serves a purely economical purpose, since the bird in all probability re-builds and re-lays if time permits, thus producing a greater number of eggs if not the original quantity. The instinct to destroy young is accountable upon similar grounds, since those animals which practise the habit are mostly prolific species and reproduce the sooner in consequence. The animal unwittingly acts upon the contention that, since the young have been discovered, their eventual destruction is only deferred. It merely anticipates the seemingly inevitable, in its jealous heart preferring itself to commit the deed than to witness its perpetra-

tion by another, while the purpose of natural economy is served by the fact that no further time is wasted upon endeavour foredoomed to failure.

It seems superfluous to remark that little real affection can figure in the mental attitude of the animal that deliberately destroys the fruit of its own body—often upon purely imaginary grounds. The only possible argument to this effect would be the very strength of the love that enables it to sacrifice affection to supposed duty. Since this would involve calculation and strength of purpose entirely outside the scope of animal nature, it may be dismissed, however, and the proceeding regarded in its one possible light as crudely primitive. One may assume with tolerable certainty that the only form of grief experienced by the animal in such a case is purely physical discomfort.

The bird at any rate does not waste time in repining. It sets to work afresh, the impulse to propagate outweighing any sense of loss. If the tragedy occurs too late in the season to admit any attempt at reproduction, which means that the instinct to reproduce no longer impels the bird, one need not necessarily assume that the sense of loss is keener in consequence. The decline of the impulse to breed would probably be accompanied by a corresponding diminution of the parental instinct which weakens with the waning season.

The swallow is supposed to forsake an unusually late brood when the call to migrate necessitates the grand assemblage of its kind. Indeed, one might go so far as to say that among wild birds instinct is definitely a more powerful influence than so-called "affection". There are, of course, occasions upon which the two influences combine, as in the defence of helpless young, under which circumstances either motive may be recognized without making due allowance for the other. The period of family life enjoyed by birds is almost incredibly brief. In the case of species that produce more than one brood, the second nest may be built and even contain its full clutch before the first family has been out of the nursery a fortnight. In such instances one can only assume that the mother bird continues the charge of the brood even while preparing for the second. The tax upon the resources of the parent at such times must be excessive. When the brood is large the task of catering for its demands must closely approach the impossible, particularly at that stage of the proceedings when the young first leave the nest. This, however, is the critical period, when the fledglings fall easy victims to their numerous enemies. From one cause and another it is probable that the number in most cases speedily dwindles, the labour of maintenance being lessened in consequence.

Responsibility upon the part of the mother

bird does not, however, end with the food problem. The young during the early stages of their growth are in constant need of warmth and shelter. During stormy weather a feathered parent covers nestlings almost as assiduously as eggs. A buzzard, recently observed, appeared to be in almost continuous occupation of the nest for some five weeks, and since the question of supplies had also to be faced during the latter part of that period, the task could have been no light one.

It is worthy of note that polygamous birds—in whose case the care of the young falls almost entirely upon the hen—for the most part belong to those orders the chicks of which are more or less self-supporting. The work of the mother in such cases mainly consists in conducting the brood to some suitable banqueting place, and guarding it as far as possible against those perils which are never far distant from the path of the wild creature.

Students of animal psychology find an absorbing theme in the question as to the amount of knowledge possessed by a young animal, together with the means by which it is acquired. One writer of wide experience and repute states his belief that the teaching of the parent plays a prominent part in the wild creature's development. Another, commenting upon this view, expresses surprise at the conclusions reached, long study in his case having led

to the formation of a diametrically opposite opinion.

When experts express such widely divergent views, the layman may well be at a loss. In this instance, however, the difficulty, as usual, arises from the unsatisfactory character of generalization. So much depends upon the interpretation of the word "teaching", also upon the character and intelligence of the animals in question, not to mention many circumstances directly or indirectly bearing upon the case. Both bears and monkeys are said to discipline their young in a manner almost human, but whether in such cases the correction takes any other form than that of repression, or is administered with any view to instruction, is more than doubtful. It might also conceivably consist of mere capricious attack. Hudson described one example of a moorhen that, as he supposed, smartly chastised a recalcitrant chick. One would suggest, however, that this was an instance of a jealous parent driving away a stranger, one of another brood that had accidentally attached itself to her own. One sees numerous similar examples in the poultry-yard or sheep-fold.

Among the larger ruminants or herbivores, whose young are long in maturing, there can be no doubt that much is learned from the older animals by force of example. Where young and old roam in herds, responsibility in all matters inevitably rests upon the more

experienced shoulders, the juniors gaining knowledge and wisdom with the progress of time. This might correctly be described as education—through indirect channels. Even so, the parent is merely instrumental as one of the general community. She is only directly concerned with the welfare of her progeny while it is actually dependent upon her care. In many cases, long before the little one has reached full maturity it has been ousted to make room for a newcomer.

This applies particularly to animals that produce more than once in the course of a year. The more prolific the species, the shorter, of necessity, must be the dependent period, and with the greater number of birds and beasts any form of actual education is obviously impossible. The short space of time that most animals spend under the parent's charge does not permit the occurrence of one-hundredth of the exigencies upon which instruction would be required were it derived from this source. The animal's very way of life differs with the seasons. A hibernating creature in early summer could not inform its young upon the construction of a winter bed, any more than the moorhen would instruct her first brood as to the whereabouts of the nearest stream, should the nesting-pond dry up. Upon the future of the cub or fledgling the parent, already fully occupied with present affairs, can bestow neither time nor

thought. The young animal finds its own feet in the world—a circumstance which the uncertainty of its steps frequently proclaims. A large percentage, indeed, comes to grief when embroiled in situations that could never have arisen had older and wiser heads directed the course of action.

Education inevitably involves at least a measure of thought for the future—a mental attitude entirely foreign to the animal mind. A course of instruction to meet a contingency involves deliberate anticipation, and this in its turn would necessitate active imagination. A bird makes no provision even in view of a future food shortage. The missing instinct to store is supplanted by the impulse to migrate either across the seas or to other localities, when any provision for future need is required, and this instinct is undoubtedly acquired by the young independently of either example or tuition. It is therefore scarcely conceivable that a race of creatures that takes no thought for the morrow where the main essentials of life are concerned, should anticipate and supply instruction to meet other contingencies of which there is no present indication. Should danger menace young birds while still under the parental care, every effort is made by the adults to extricate the brood from its predicament. This usually takes the form of example by inducement to the young to follow them in flight. The effort, more

often than not, proves useless, the young being physically incapable of adopting the course suggested to them. As a rule, the little ones are obliged to take their own line—that of concealment, a proceeding which is certainly not indicated by the parents. In a crisis, instinct proves the surer guide and Nature the sole instructress upon whose tuition their lives are shaped.

The parents, whether bird or beast, are mainly instrumental in curtailing family relations. As long as food is provided the young are naturally only too willing to accept it. When supplies are no longer voluntarily given they pursue the source from which the provender was derived, until, at last, the adults either take refuge in active discouragement, or abandon the young to their own resources. This has doubtless given rise to the idea, still prevalent in many quarters, that the young of certain species either banish, or actually kill their progenitors. In isolated cases, indeed, this may occur. Where territorial rights exist several claimants may contend for a desirable locality, and it is quite conceivable that parent and offspring may occasionally meet in conflict. If such unnatural combats take place, however, it is clear that the senior, being more experienced in warfare, usually proves victorious. As a general rule, there can be no doubt that the bird which remains in possession of a given territory is the

same individual, its identity being proved by peculiarities of character and disposition unmistakable to a discriminating observer. In the course of nature, as a bird becomes debilitated by age, it may be ousted by one of its own brood, but this is the exception rather than the rule. An old bird is more likely to kill one of its own descendants than a young one to prove a parricide, and in any case, duels to the death are not customary in the wild. If the path of glory leads to the grave, there are few birds that do not prefer a road which offers a happier destination.

In attending to the needs of a growing brood, a male bird takes his share, although he may not invariably prove as assiduous an attendant as the mother, being more liable, perhaps, to neglect his responsibilities. Among certain species he is even said to complete incubation should accident befall the female, and undertake the charge of the family single-handed. Whether an authenticated instance of this exists, however, is improbable. Usually the death of the female involves the loss of her eggs or even of her chicks, examples being too numerous to leave any doubt upon this head. It seems probable that the cock's share in the proceeding is mainly inspired by example, while in the case of fledglings that attach themselves to the male parent while the mother is otherwise occupied, his attitude rather suggests that the charge is thrust upon him.

He presents a droll spectacle upon such occasions. His young sons and daughters appear to take full advantage of his credulity and lack of firmness, and not infrequently, when fully capable of fending for themselves, continue to make his existence a burden to him by persistent and vociferous demands, sometimes hurled at him simultaneously from all sides when the party is feeding in company. They may be procuring their own food without difficulty when left to themselves. The moment he appears, however, they simulate dependency, besieging him with open beaks and raised wings. As the applicants for provender close in upon him he becomes visibly flustered, but does his obvious best to meet the situation, frantically thrusting fragments of food into each open mouth. The comedy, however, invariably terminates in the inglorious flight of the harassed parent, who finds himself utterly incapable of rising to the occasion.

Very different is the question as to the part taken by the male bird in the actual incubation of a clutch. This tendency may run in species, but, even so, everything points to the probability that the frequency of its occurrence has been considerably exaggerated. With the commoner birds, the proceeding is certainly not habitual, and since in many cases the sexes are almost indistinguishable, the utmost care is advisable when making statements upon this head. It

must be remembered that the desire to incubate is consequent upon a physical state, under the influence of which—and then only—does a female bird undertake the task. Unless “broody” a farmyard fowl would merely ignore the “sitting” with which she had been provided, and the case of a wild bird must obviously be similar. The parallel is, indeed, sufficiently apparent. Some birds delay incubation until a week or so after the clutch has been laid. Others settle to the task before the process of laying is complete, while a few evince an inclination to sit even before an egg appears. The latter tendency constitutes a common feature of a backward spring, when birds may be found sitting with every appearance of solid intent upon empty nests. As incubation proceeds, the broodiness intensifies, until the bird reaches that state which in general parlance is known as “sitting hard”, when at times little short of actual touch is required to dislodge even the wildest species—or, in other words, to arouse her from her stupor. The bird takes little food during this period, and loses a considerable amount of flesh.

It would be interesting to discover and identify a male bird in such a state, even supposing the case to be a physical possibility. Without it, upon the other hand, alternate brooding, undertaken systematically, seems inconceivable. Indeed, considered from a general standpoint, the proceeding can only be regarded in a reason-

able light as abnormal, confined to species or to strains abnormally disposed, and, under any circumstances, merely the assertion of a freakish impulse. Among many species of animals one occasionally observes an inclination upon the part of individual females to usurp the functions of the male, the case in point suggesting an example of the situation reversed.

There are alternative explanations, the simplest of which is mimicry—a factor which must figure prominently in the domestic behaviour of birds. Having assisted in the construction of the nest and witnessed the use to which it is put, a cock bird might be seized with the desire to occupy it, particularly during the hen's absence, even as a dog takes immediate possession of a basket or chair momentarily vacated by another. This has probably induced the habit to a large extent among birds kept in captivity, their state being responsible for the development of many abnormal attributes. The supposition that the task is undertaken as a relief measure while the hen feeds is assailable upon the grounds that the female, after the earlier stages are past, is in no condition to need either relief or food in any considerable quantity. She vacates her post for short periods only and at long intervals, and anyone who happens to visit the nest during her absence is tolerably certain to find it unoccupied. Indeed, the chances are that if the hen is foraging, her mate is accompanying her.

Again, were relief necessary, the need, presumably, would be general, and not confined either to individual specimens or members of any prescribed order. It is only reasonable to assume that polygamous birds which have no mates would also require understudies for "relay" work. A grey-hen might with good cause envy the red grouse, while a hen pheasant's lot would compare most unfavourably with that of a partridge, being a bird of similar requirements and even more restless spirit, yet called upon to bear the full burden of a task which her more fortunate relative could share with another.

There would also arise the case of the bird whose mate disappears during incubation. A lone hen in charge of a family is not uncommon, and though her task is naturally rendered the more arduous when the brood is growing, she would at least experience no difficulty in bringing the young to birth. That part of the proceeding is so clearly the hen bird's province that the male's share in the rare instances when it is undertaken, may be regarded as unimportant. The incubating cock seems as far removed from the general conception of the wild scheme as the proverbial "crowing hen", and if not altogether as useless, at all events unnecessary.

•

CHAPTER III

RELATIONSHIP

SO far as one can judge from evidence available, it will appear that the parent's care, together with that quality which has been termed "affection" for lack of a more descriptive expression, extends only to the visible. Were the family, whether brood or litter, discretely reduced by the surreptitious daily removal of one member, the parent would not only make no effort to recover the absentee, but would remain in complete ignorance of its loss. Upon the same principle, when a brood of fledglings disperses while still in a semi-dependent state, the efforts of the seniors to supply the needs of individual claimants are confined to those which make their needs apparent. "Ask and it shall be given you" is the motto of avian incapacity, and it is tolerably certain that the requirements of a silent member, together with his existence, would be completely ignored. The grey hen is perfectly content as long as a single chick remains in evidence to provide an object for her care, and although hers is a somewhat extreme case, the same principle applies to all birds in a greater or lesser degree. With beasts

such as foxes the situation is somewhat different. When a cub wanders, the vixen in her perambulations can scarcely fail to cross its line, which she would naturally follow, and so, becoming cognizant of the cub's whereabouts, attends to it as a matter of course. A young bird upon the contrary, if unable to make itself heard, is in a hopeless case, unless capable of supplying its own wants.

One assumes a reason for every natural provision. It may not always be apparent, owing, probably, to the dislocation of Nature's scheme wrought by changing conditions, but in this case the theory that suggests itself is not without interest. Superficially, one might be inclined to think that the almost universal tendency among young animals to disperse at the earliest possible moment had no other effect than to increase the difficulties of the parent's already heavy task. Up to a certain point this view is undoubtedly correct. If the brood remained intact, the parent's work would at least be localized. Upon the other hand, there would be no equal distribution of rations. The stronger, and therefore more insistent, would claim and obtain the entire spoil, both from the bringer who would observe no standard of impartial division, or from the weaker members upon the rare occasions when these succeeded in procuring a share. Scattered, upon the contrary, every individual stands a good chance of making

itself heard, and any share that it obtains it is able to demolish at a greatly reduced risk of robbery. Here and there individuals may perish for lack of attention, but the welfare of the majority is assured.

Many sportsmen hold the opinion that vixens deliberately divide their litters, when sufficiently large, for this reason. Long consideration of the subject, however, dispels the belief that the course is adopted with conscious intent. Of the division there can be no doubt. It seems equally certain, moreover, that the "out-lodgers" consist of the more voracious cubs. These, being necessarily the stronger, however, are more disposed to wander, and, having found fresh quarters, would continue to receive the mother's attention as long as the appeal to her protective instincts survived. The desire to escape from the actual nursery at the earliest date is characteristic of young animals. When out, they frequently pursue their demands upon the parents as long as the latter permit them. None the less, they claim the right to follow their own devices, which in the case of all but eminently gregarious animals usually manifests itself in independent action, and almost invariably where rapacious animals are concerned, in a predilection for separate quarters. Even when hunted, a fox-cub does not usually seek protection in the earth where it was reared, unless at a complete loss to find another sanctuary. If he does

so, one may take it for granted that he was the "runt" of the litter, one that exercising the privilege of a "youngest son" has remained in the family home until the end. The sturdier members would not need the offices of the vixen to effect an early separation. The tendency to "seek a kingdom of their own" is natural and universal, although asserting itself earlier in some races than in others.

There is also another natural reason for the dispersal of wild families, unrecognized by the creatures themselves, but so obvious as to leave no room for doubt. Animals acknowledge no blood relationship. When the natural emotions of the breeding-season have ceased to function all ties are severed. Parent and young, brother and sister, meet as strangers, presumably without a vestige of recollection or recognition. But for a wide and general "reshuffling" among individuals of every species, the effect upon the race need scarcely be imagined. If every brood or litter remained in the locality of its birth there would scarcely be a mating that was free from relationship, a decadent strain being the inevitable consequence. Nature's provision against such a contingency is as drastic as it is simple. One wonders why birds of strictly territorial habits do not multiply; why the young of species such as the raven, the ring ouzel or the kingfisher disappear from the locality in which they were successfully hatched. Many

contributory causes there may be, but one is plain. Nature forbids the union of near relations. The old may expel their offspring ; the young may experience no desire to stay, being governed by the impulse to wander far afield, or in other words, to seek a mate sprung from some distant strain. No matter in which way the provision works, however, the effect is the same. A young bird seldom returns to build in the near proximity of its native spot, and if it does so, one is tolerably safe in assuming that it has found a mate elsewhere. One would not for a moment suggest that inbreeding does not occur. Doubtless it happens in many instances, but the countryside is sufficiently wide, and wild life still sufficiently numerous to prevent the exception from degenerating into the rule.

Among gregarious animals, such as deer or the larger ruminants, the law is enforced by the propensity upon the part of the older males to banish juniors, obliging them to seek a harem elsewhere. In large feathered assemblies, again, such as rook colonies, the monopoly of nesting sites by old pairs ensures a considerable efflux of younger blood, while the numerical strength of the population, and the generally communal habits observed during the winter months, provides for the effective mingling of the race.

The time of dispersal varies considerably, according to the species. Partridges, for example, remain in coveys until the approach of spring.

Before they pair, however, it may be noticed that the depleted broods which in their natural state—that is to say, if unprotected by man—would have been reduced to a corresponding extent by wild enemies, usually pack together. Their range has widened ; birds from adjoining localities have joined forces, which means an incursion of new blood, so that when they eventually dissolve into pairs many families are represented in the unions. Pheasants commence their peregrinations early in the year, and stray so far afield that the spring harems, when formed, must be virtually cosmopolitan. In any case, with polygamous birds, as with beasts, the older cocks usually take charge, the same applying to black grouse and doubtless others of the order.

Among all birds it is sufficiently clear that the respective status of parent and young ceases within the year. There is, however, scope for much conjecture as to the position of mated pairs. In the case of birds that observe more or less solitary habits, the partnership is certainly lifelong. Crows, ravens, and most of the rapacious species may be seen in attendance upon one another throughout the winter. They may not always be in company. Indeed, birds of prey as a rule hawk alone. They frequently forgather, however, particularly towards the close of day, usually frequenting a common roosting-place, and, if both survive, resume connubial relations with the advance of spring. They

even appear to pass through a short amorous period—secondary or preliminary, according to the light in which it is regarded—after the autumnal moult, when the conditions are conducive to the lighter emotions, but this will be dealt with at greater length in a subsequent chapter.

The Darby and Joan tendency upon the part of the larger birds seems indubitable to any close observer. At the same time, if such is the rule, one finds difficulty in accounting for the fierce conflicts that take place between male birds in the spring, combats in which species perennially paired according to convention, certainly participate. Are these combats, one wonders, confined to birds that have not yet secured mates, or do occasions arise upon which a successful Benedict of one or more seasons' standing is compelled to defend his claim? In such a case doubt might also be entertained as to the constancy displayed by the object of dispute. One has no means of knowing whether the fights that are witnessed represent fair duels. Upon occasions three or four birds are undoubtedly implicated, and more than one course is open to the feathered lady. She may transfer her allegiance automatically to the conqueror. She may reject all the battered belligerents in favour of a new suitor, or she may join forces with her husband to effect the discomfiture of an interloper. One is not certain that the last

course does not most closely approach the probable. The wolf parents of White Fang, when once they had come to an understanding, showed a united front against all further claimants. This was fiction, indeed, but there is a suggestion of possible truth underlying the story which might easily apply to the customary procedure in the wild.

If avian partnerships are indeed dissolved by other factors than death, it is at this period of conflict which takes place in early spring. All considered, however, in the case of birds that have not separated throughout the year, the suggestion seems improbable. One rather inclines to the view that, if both birds survive, the actual state of things continues. Species that separate in autumn, or assemble in large flocks for the winter months, are naturally in a somewhat different case, and it seems unreasonable to suppose that out of a company numbering hundreds or even thousands the original pairs reunite. Even this is not *impossible*, however, for if a female rook or starling remembers the old nest or site, there is no cogent reason why the male should not do likewise, at least to the extent of returning to its own locality, the old relations reviving automatically.

Latterly, there have been many subscribers to the theory that the cock-bird not only precedes the hen, but actually selects the nesting area. In certain cases this may happen, but one can

scarcely suppose such an order of events to constitute the rule. The hen is surely the authority upon all matters appertaining to nest-building. When the identical nest is reoccupied—and it may be taken for granted that if only one of an original pair returns to a prescribed spot it is the female—one can scarcely imagine one hen utilizing the work of another. If the actual structure is not again requisitioned, the new site will be sufficiently near and similar in individual characteristics to leave no doubt as to the identity of the architect.

After all, it is only consistent with general procedure in Nature that the nursery should be the maternal province. It is the mother rodent that plucks her breast, the vixen that selects and draws out the earth, and upon the same principle one may rest assured that the depositor of the eggs controls the preparation of their receptacle.

There is no justification for assuming that birds differ from other creatures in this respect. The male assists or hinders, as the case may be, but his cannot be the master mind in any affair so clearly outside his province. Indeed, in the elation of his honeymoon, it is doubtful whether such a possibility as the necessity for a nest as much as crosses his mind, until his mistress embarks upon the task of collecting materials.

With regard to migrants taking possession of a locality, it is difficult to make a definite

statement as to which, if either, of the two birds is first in the field. Much would depend upon the date of their arrival. Late comers would probably pair before quitting their winter quarters, or possibly upon route, and would therefore almost certainly arrive in company. So far as unmated birds are concerned, the males might conceivably be the first to reach the country and await the arrival of the other sex. They would certainly *seek* the latter upon their appearance, however, such being the procedure adopted throughout the animal kingdom from the highest to the lowest.

When the great northward drift of migrants is in full progress, the task of determining which sex heads the movement is no light one. There are many points to consider. Assuming that a certain amount of sex division takes place during the winter months, any species that observes this custom would inevitably arrive in contingents, and during certain periods, for a variety of reasons, companies of either sex might predominate. This scarcely amounts to proof, however, for even were whole flocks captured and examined, there would be no evidence that companies of the opposite sex had not either preceded them or entered the country simultaneously by other routes. One or other would be tolerably certain to predominate in any given district, but clear evidence as to a definite or established procedure is practically unobtainable.

It is quite possible that male birds experience the urge to migrate earlier than the females, particularly if migration precedes pairing. In such a case, the birds concerned, when dispersing after arrival, would doubtless proceed, each to his own place. The females, coming later, would adopt a similar course, and each bird upon reaching her ultimate destination would find her mate awaiting her, that is to say, assuming the cock also to be subject to the "homing instinct".

However that may be, if reunion takes place after separation in distant lands with no record of adventure shared and travel undertaken in company, it might be argued that, the life partnership admitted, the latter could only be regarded as a "marriage of convenience", undertaken in the course of nature and serving little other purpose than the propagation of the species. In other words, it would seem that the birds are wedded to place rather than to individuals. Admitting the separate arrivals for the sake of argument, the procedure of one bird, should the other fail to materialize, can only be conjectured. The position suggests several possibilities. The bird might remain in the locality cherishing a forlorn hope. If the male, it would be more likely to forsake the neighbourhood in search of better fortune elsewhere. The most probable sequel, however, would be a second marriage. Should the survivor happen

to be the hen, the sole difference would be that the old nesting-place would know a new master. If the cock provided himself with a new mistress, the original spot would probably be abandoned in favour of another somewhere in the vicinity. A change of the latter type usually means a change of regime.

Needless to say, the state of affairs thus depicted is purely provisional. Neither logic nor intimate acquaintance with avian nature lends much countenance to the idea of either bird *consciously* awaiting the other—as an individual. It is more than doubtful whether either would even be recognized as such upon presenting itself, or that the claims of “auld lang syne” would enter into the matter, either tacitly or otherwise. Assuming the separation which the hazards of a long overseas journey and life abroad render more than probable, husband and wife, if they meet again, might do so, not as strangers, for they would probably resume the threads where dropped, but as old acquaintances which have encountered one another accidentally. Each would be seeking and anticipating a mate, irrespective of identity. If through the chain of circumstances the mates of former years reunite, the birds themselves could scarcely be regarded as responsible agents in the matter. Whether preference would be shown upon the score of prior claim is an open and interesting question. Among large communities such as

swallows, a general interchange might easily take place without the most shrewd observer being any the wiser. The point could only be determined in the case of an isolated nest, and this would in no way settle the question as a whole.

The foregoing remarks, it should be emphasized, apply exclusively to migrants, or to birds that congregate in large winter flocks and journey considerable distances from their customary breeding-places. Residents necessarily occupy a somewhat different position. In their case at any rate, there is no compulsory dissolution of partnership, and with the majority of species there is good reason to believe that pairing for life is the rule rather than the exception. This certainly applies to the common birds of the garden when kept under constant observation—so far as it is reasonably possible to form conclusions. The existence of affection in any form is another matter, and one would rather suggest that in the case of many birds the perennial partnership is consequent upon mutual habitat and requirements. Should one of a pair come to grief during the winter months, it is doubtful whether it would be mourned as a lost mate by the survivor if other companions were available. Birds, such as the rapacious species, that depend upon one another for companionship would doubtless be differently affected, in a degree depending largely upon circumstances.

It is distinctly curious that the rôle of *protector* is seldom adopted by a monogamous male, whether bird or beast, excepting during the breeding season, when either parent defends the nursery or young against any enemy other than man. Almost without exception in the case of birds that pair, there is little physical disparity between the sexes. The male may possess a more pronounced beauty of plumage, but he is not as a rule the stronger, and is frequently the weaker of the two. When it becomes a question of defending offspring the female is usually the more formidable, while one rarely, if ever, sees an example of a cock championing a hen, or voluntarily yielding precedence in the matter of food. He may convey supplies to her when she is incubating, but beyond the execution of this plain duty to which instinct impels him, there is no indication of a chivalrous attitude. Not that the hen of necessity requires it. As a rule she is more than capable of guarding her own interests, and as often as not the cock is the bullied member, the difference between monogamous and polygamous species being all the more pronounced in consequence.

One has only to consider the position of an avian harem, a flock of geese or turkeys. Most people at some time or other during youth have suffered from the over-zealous guardianship of a bellicose old gander or gobbler, whose wild representative would presumably act in a similar

manner under corresponding circumstances. A domestic rooster, when he unearths some special dainty, refrains from demolishing it himself, summoning, instead, his female following to enjoy the fruits of his discovery. The same bird utters a loud warning note, peculiar to his sex, when a suspicious shadow falls across the yard, and one sees the same policy adopted among domestic cattle. Sheep need no other protection against a canine destroyer when the flock contains a fierce old ram. It is the bull whose ominous roar assails the stranger when crossing the pasture.

Conditions could scarcely be otherwise, for among such birds and beasts the male is incomparably the finer animal. In character he may not be all that could be desired. At times, for example, the behaviour of an old red stag is reprehensible in the extreme. None the less, his armament and frequently his intellect are superior and he almost invariably proves the more formidable antagonist. Consider, again, the familiar case of the cock pheasant. Resplendent in appearance as compared with his soberly dressed mistresses, he excels them in guile even more than in plumage. The circumvention of a wild cock pheasant is something of a triumph to any sportsman, but little prowess is required to encompass the downfall of a hen, and no glory attaches to the achievement. Then consider the monogamous partridge. So far as the

sportsman is concerned, there is no distinction between the sexes. In canny old age the one is as elusive as the other, and if either turns the scale upon the question of craft, the balance might easily declare itself in favour of the sage and perhaps more responsible female.

It would almost seem that the superior physique of the polygamous animal had been granted by Nature in view of the greater responsibilities that it is called upon to face, or the far greater demands upon its vitality that the maintenance of so large an establishment must involve. It should be remarked, that the master of a wild seraglio is more concerned for the safety of his female satellites than with that of their offspring. The cry of a calf or the chirp of a chick would bring an infuriated mother to the rescue. Upon the other hand, the plaint of an adult lady would be required to ensure a charge from the master bull or feathered lord of the harèm. Where any monogamous species is concerned, the fate of the offspring becomes the affair of either parent, although the mother displays the more ferocity in defence and the greater courage.

The question of cause and effect is no less involved in Natural History problems than in others. It might well be that the ascendancy of the male among these groups of animals was acquired by virtue of obvious physical superiority, but, however that may be, the polygamous male is always the master, frequently the pro-

tector ; the monogamous creature seldom the one and never the other. There is another aspect of the situation, however. While the lord of the harem is by way of being a despot, the mated bird, at any rate for the duration of the season, lives in a state of *companionship*. That each is content with his condition goes without saying, for wild inclination is wild law.

Few birds, excepting those of definitely polygamous habits, take more than one mate in the course of a season, so far as can be ascertained, even when several broods are reared. The wood-pigeon is one that may not invariably conform to this rule. It produces so frequently, incubating upon occasions as late in the year as mid-September, that more than one mate might easily come to a violent end within the period. The species is shot in large numbers at mid-summer on account of its depredations, and since it also falls a common prey to hawks, individuals must therefore have frequent occasion to find a fresh mate, unless, indeed, each pair of young produced is the fruit of an independent union.

There are, indeed, many birds and beasts with regard to which definite evidence as to whether they mate promiscuously, or " pair " for at least the duration of a season, is unobtainable. One could indicate no better illustration than that of the vagrant cuckoo. A female cuckoo in early May is seldom unattended, but to state positively that she is either indiscriminate or conservative

in the bestowal of her favours would constitute a bold assertion. Upon such a point there are no means of obtaining proof either final or conclusive.

For a characteristic instance among beasts, one need look no farther than the rabbit. During late February these animals are almost invariably found in pairs. A burrow will contain either two rabbits, four, or six, according to its size and the abundance of the game. These are certainly mating, and the distribution of the sexes appears to be equal, yet few people would go so far as to suggest that there is even a hint of finality attached to the arrangement. Later in the season the opportunities for making observations or drawing conclusions are less favourable, but one rarely sees two adult rabbits with a litter attached under circumstances that in any way suggest a family party. The does may usually be seen among young of varying ages. These are established in small burrows which are seldom used for other purposes and rarely entered by the bucks. The does are mainly engrossed with litters still in the dependent stage, affairs of amour being conducted by way of interlude above ground, and in a manner that more than resembles promiscuity. This is not quite reconcilable with the aloof and honeymoon-like procedure of the February couples, the changed relations being effected, it would seem, by the arrival of the young, con-

tinuous relays of which occupy the female's attention.

The entire question as to the conjugal relations that exist in the animal kingdom bristles with anomalies, difficulties and insoluble problems, nor can one formulate any standard upon which definite conclusions may be based or a hard line of demarcation drawn. The position is characteristic of human insight into Natural History mysteries, penetrating little deeper than the obvious or the superficial. Whether in many instances that obvious little, like the iceberg's tip, serves to indicate the unguessed bulk below, or whether there is little more to be seen, might be added to the list of riddles. It would almost seem that the one satisfactory attitude is that of the animals themselves—adaptability to circumstances without query or conjecture.

•

CHAPTER IV

THE HIGHER QUALITIES IN ANIMAL NATURE

AT the present time it would be difficult to decide which is the more prevailing tendency, to idealize animal character, or altogether to disallow the existence of the higher qualities in birds and beasts. Certain creatures are not infrequently represented as emblems of courage, industry, or constancy, yet at the same time the vocabulary contains no expression of opprobrium more denunciatory than such terms as bestial, brutish, or brutal.

Perhaps it is superfluous to remark that, as a rule, neither picture is strictly representative of the actual case. One might, indeed, assert with truth that the "animal hero", together with the furred or feathered embodiment of connubial and parental virtue, exists only in sentimental fiction. Upon the other hand, the opprobrious terms are even more commonly applied with reference to conduct of which few birds or beasts would or could be guilty. It is probably correct to say that animal mentality is incapable of attaining either the nobility of purpose or the refinement of vice which lies within the scope

of the human intellect. The animal wittingly aspires to no ideal, recognizes no moral code. Its one standard is efficiency in its own department, its main aversion the abnormal. The old idea, so popular in fiction, of the wild leader of flock or herd, worsted in fight and promptly destroyed or banished by his former followers, has probably a foundation of truth. It is the way of the world, whether wild or civilized, to join forces with the winners in life's contests, and the animal that is obviously facing failure soon finds himself assailed by the entire community. Whether he was formerly the bully or the butt matters nothing. The law provides for the survival of the fittest, and however his overthrow came about, he has failed and must take the consequences.

Ability to hold its own is required of every wild creature, although upon certain occasions, as when opposed to a common enemy, it may claim the support of its fellows. Every animal, moreover, must conform to type. Apart from these essentials, its actions in the natural state and within its physical limitations are governed purely by its own inclinations, and the fact that these at times either exceed or fall short of human standards is usually due to lack upon the animal's part of that realistic imagination which so often incites or restrains the purely natural impulses of a human being.

As in all such questions, failure to recognize the impassable gulf which divides the mental

outlook of man from that of the beast is responsible for the frequent misapplication of descriptive phrase or simile. A proceeding that would tax the intrepidity of a human being to the uttermost might demand no exercise of courage upon the part of an animal. Iron-nerved must be the man who could walk without support along a single plank spanning a dizzy chasm, but to the majority of light-footed animals the precarious path would present no terrors. The human brain, well aware that the least slip or momentary loss of balance must involve sure death, is naturally a prey to the most fearsome possibilities. The animal, who knows no sense of giddiness and does not even anticipate the chances of slipping, sees no cause for trepidation, and in consequence accomplishes the perilous feat entirely unperturbed.

It may be a platitude to add that without fear, or at least active realization of danger, there can be no bravery. Fools rush in where angels fear to tread, and without any desire to be cynical or to disparage many excellent traits of animal character, one cannot but note that the conventionally courageous beast as a rule is either the least intelligent or one that is specially protected against the perils to which its fellow creatures are subject. Upon the part of the badger who boldly destroys the wasps' nest no courage is required, since the shaggy beast is well aware of its own immunity. His bravery

upon such occasions is merely that of Achilles whose daring feats might have been emulated by anyone gifted with similar invulnerability.

That certain animals both realize and deliberately incur risk is beyond question, and here there is need for discrimination between the shrewd gambler with fate and the comparatively senseless brute, the natural belligerent, who rushes into strife for the sheer love of it. The case of the common and unpopular rat, who with infinite caution extracts the bait from the all-too-apparent trap, differs widely from that of the black rhinoceros who charges an armed caravan. The one accepts an obvious challenge though keenly alive to the hazardous nature of the undertaking ; the other, impelled by blind ferocity and the arrogance of irresistible might in its own domain, merely vents its animosity upon an intruder of whose powers to retaliate it has no conception.

Of an animal's ability to conquer fear one can offer no better example than that of the domesticated horse, the "hunter", when ridden hard across country. There can be no doubt that the well-bred horse *enjoys* jumping within limitations. It is exercising a natural gift, a proceeding in which every normal creature finds keen physical delight. When clearing an insignificant obstacle in its stride, the hunter or racehorse must experience sensations akin to those of the chamois when bounding lightly from rock to

rock. As long as it is confident of its own ability, the beast takes pleasure in the performance. The eagerness that horses display leaves no doubt upon this point. There comes a time, however, when its confidence weakens. Wearied from long-sustained effort, it is suddenly confronted with an obstruction of alarming strength. It feels unequal to the occasion and possesses sufficient intelligence to dread the possible consequences. Fear becomes apparent in its wild eye, and its reluctance to attempt the leap is made evident in numerous ways. It may refuse altogether to make the effort. More often than not, however, the risk is accepted. It might be argued, of course, that the horse only acts under compulsion, its fear of the rider over-ruling the less definite apprehension of failure. But, however that may be, the action is deliberate and the demand upon the animal's fortitude great.

The sportsman not infrequently complains of "cowardice" upon the part of hunted animals. There is always the bird that will not fly, the rabbit that refuses to bolt, the "craven" fox that adheres to cover. But whether such creatures are in reality the most fearful or the most courageous of their race is a moot point. Headlong flight from imminent and obvious danger is scarcely a proof of "gallantry", although the term is usually applied to the animal who adopts this course and so facilitates pursuit—the end most desired by its hunters. It does not seem

unreasonable to suggest that, in truth, the bolder animal is the one that refuses to be ousted from its stronghold, as often as not saving its life by sheer temerity.

In the wild state there is probably no such thing as a "coward". According to its own unwitting but none the less rigid standards, every creature is endowed with sufficient fortitude to meet the exigences that arise in the ordinary routine of its life. The standard certainly varies according to the species, each observing a line of conduct to which individuals conform automatically. It would almost seem that even the exercise of the higher qualities are mechanical in the animal kingdom. The wild parent, when facing danger or privation for the sake of its young, is influenced by no exalted motives of self-sacrifice, but obeys the promptings of an impulse over which it has no control. It is usually a case of conflicting instincts, of which the more powerful for the time being cannot but prevail. One may assume with tolerable certainty that the brooding bird who remains at her post even in the close proximity of some deadly enemy makes no conscious choice when adopting so perilous a line of conduct. It is more likely that to all intents and purposes she is incapable of acting otherwise. The instinct to incubate is so powerful, her physical torpor so intense, that she is figuratively glued to her eggs, to abandon which would require an even greater effort of

will than the passive act of remaining motionless. In many cases, little short of a physical shock can arouse her from the petrified state under the influence of which she is probably impervious to any realization of her own imminent danger. The fact that her tenacity increases as the completion of her task draws near—in other words with the growth of the incubation instinct and its accompanying stupor—goes far to disprove any question of voluntary action upon the bird's part. Were she in truth impelled by deliberate consideration for the possible fate of the eggs, she would shield them as resolutely during the earlier as throughout the later stages. In the former case, however, she is mainly concerned for her own safety, and as often as not forsakes her post while the supposed danger is yet distant. Later, it is doubtful whether the brooding bird in her torpid state as much as realizes an intruder's presence, or, if so, she is probably only aware of it in the same manner that one is conscious of disturbance when under the influence of sleep or some intense preoccupation.

The extent to which a wild creature becomes a responsible agent in the active defence of its young is a more open question. Here, again, there arises the difficult problem of natural impulses at direct variance. It must once more be emphasized that each species conforms to a prescribed line of conduct upon such occasions, and for the most part members of any particular

race act in a precisely similar manner. Some slight difference in the conduct of individuals is inevitable, for no two creatures, either physically or mentally, are *precisely* alike. Whether the normal game-bird, distressed for the safety of her brood, is capable of acting otherwise than feigning injury at the intruder's feet seems more than doubtful. She is impelled by a natural impulse which she cannot but obey, and for the promptings of which she is not responsible. It is the long-acquired habit of her race, and for the wild creature habit is law. Whether creditable or the reverse, one cannot term its observance voluntary, since it does not occur to the animal to act otherwise. The very motive may be as obscure as the proceeding itself is automatic, since no bird with its limited measure of intelligence could wittingly simulate the effects of an injury which in all probability it has neither experienced nor even witnessed.

One may reasonably doubt whether a bird, when adopting such a course, as much as recognizes the enemy as constituting a source of peril to itself. That its mind is incapable of embracing more than one idea at the same time is obvious from the conduct of its everyday affairs, and one may rest assured that when consumed with anxiety for its young it loses all consciousness of its own danger. It is worthy of note, moreover, that birds which possess the instinct to shield their offspring at their own risk are not neces-

sarily in other respects the most courageous, the most intelligent, or even the best parents. Indeed, the larger birds, which, generally speaking, occupy a higher intellectual plane, fall singularly short in this respect, and for some curious reason it is the game-birds—those which have particular occasion to dread man and his activities—that not only confront the human enemy with the greatest boldness, but even venture at times upon actual attack. No other diurnal species as a rule proceeds to such lengths, although it is a common habit of owls during the breeding season.

At first glance, the passivity of the larger and, particularly, the rapacious birds, when their broods are menaced by human beings, seems unaccountable. One might naturally have expected creatures to whom conflict is habitual to adopt the more aggressive tactics. They display for the most part an equal disregard for their own safety, but, apart from clamorous protest, make no attempt at rescue, direct or indirect. When describing British eagles, the late Charles Dixon wrote as follows :

“ In spite of what has been stated to the contrary, the eagles are cowardly birds when their nests are invaded by man. The popular notion is that the eagle will attack even human intruders, but such is not the case ; and when disturbed from their home, the old birds are content to watch our movements whilst sitting on some distant crag, or evince their anger by swooping past the face of the cliff, but always well out of harm’s way.”

It is somewhat curious, moreover, that the ability to employ artifice should be confined to certain species, but in this very circumstance there probably lies the solution of the problem. It has been suggested that the famous broken-wing trick, practised mainly by game-birds, wild fowl and the plover and lark families, has evolved as a direct consequence of immemorial persecution by guns and other missiles. This seems plausible enough until one remembers that pigeons, who probably suffer more from guns than other birds, have no knowledge of such practices. A woodpigeon, driven from her eggs or newly hatched nestlings, seeks immediate safety in flight, and, curiously enough, it is the young birds that face the intruder with a boldness entirely foreign to their character and habits in later life.

It will be seen, therefore, that acquaintance with the gun is not responsible for the trick of simulating a wound—which, incidentally, does not always take the form of a broken wing—or it would presumably have been acquired, not only by pigeons, but by the feathered outlaws, such as carrion crows or magpies, the greater number of which meet death in the form of shot. It transpires, however, that the habit is almost exclusively confined to birds that nest upon or very near to the ground. Where they nest the young are reared, and since the earth is infinitely more perilous than the branches, some special

provision for the safety of chicks that are still unable to fly is imperatively necessary. The performance, so far as one can judge, is essentially intended, not so much to lead away an enemy as to gain time during which the young birds take cover. When this is effected the parents retire, their duty accomplished, leaving the affair to take its natural course. Branch-builders employ no such tactics presumably for the simple reason that they have no occasion to do so. In their case no purpose would be served, the position of the nest, if well selected, providing sufficient protection to the brood. In any event, the young birds, if unfledged, cannot leave the nest, and, should they be discovered and assailed, they fall back upon other lines of defence. When old enough to realize their danger, some sham death ; others show fight, of which the young woodpigeons already mentioned provide a pathetic example, while certain of the larger species have less pleasant means of discouraging too close inspection. Needless to add, the young of ground birds which lack the protection of an exalted nursery are far more gifted in the matter of self-preservation. Many of them acquire the full use of their legs as soon as they chip shell, while the protective colouring, which is entirely lacking in the case of branch-building species, renders them nearly invisible among their natural surroundings. Generally speaking, it would seem that the nests which remain occupied for the

longest periods are the least accessible. Each species, indeed, is endowed with its own special means of defence and the necessary qualities to enable it to pursue the line of conduct that its instinct dictates. The wiles of the lapwing, the uncalculating courage of the hen-pheasant and capercailzie, the artifices of the partridge or plover merely contribute to the perfection of a great system in which the birds themselves play no conscious part.

As a general rule, in human life, bravery is an individual rather than a natural characteristic, although, owing partly to tradition, upbringing and various circumstances, certain races are more courageous than others. Among animals, upon the contrary, every species and even every variety appears to possess a standard of courage from which few individuals depart in either direction to any marked extent.

One enjoys exceptional opportunities of discovering the fearless or timid tendencies of various species when endeavouring to tame them, or whilst catering for their needs during hard weather. When frost is exceptionally severe, it sometimes happens that the bird-table is visited by an army of starlings, which literally takes the place by storm. It is obvious that these dagger-billed hooligans are as hungry as any of the feathered community, and one is willing enough to provide them with all that they require. A starling, however, is nothing if

not thorough, and pursues voracity, together with exclusiveness, to so pronounced a pitch that some protection for other birds becomes essential. A starling's perseverance is inexhaustible, and he is, therefore, not easily discouraged. Fortunately, however, his disposition is timid, and one may surmount the difficulty to some extent by spreading a supply of food in the close proximity of an open window. To this the majority of garden birds will come readily, but the starlings will not approach within a specified distance. One may watch thrushes, finches and tits all feeding fearlessly, with the starlings forming a discontented ring around but not venturing to participate.

This is not a question of timidity being due to lack of familiarity with the situation. Many birds that come at such times are also strangers, but being bolder-spirited than the vulgarian horde, accept any possibility of risk with less reluctance. For all their lack of confidence, the starlings provide an interesting illustration of the exceedingly transitory character of animal fear. At the first movement in their direction, they scatter in seemingly panic-stricken flight, only to return within the space of a minute or so as noisily aggressive as ever. Indeed, the task of protecting a bird-table that has once been discovered by starlings is almost equivalent to beating back smoke. The one means of combating the menace, or at any rate of relieving

pressure, is to provide an alternative "food-dump" at a convenient distance. If any wild creature may justly be accused of greed, the starling certainly comes within the scope of this charge. It is not always easy, however, to trace the line of demarcation between gluttony and mere satisfaction of a naturally voracious appetite. Contrary to convention, greed in the literal sense is not a feature of animal nature. Few, if any, creatures eat more than they actually require. Even the stereotyped "gorge" as often as not is either preceded or followed by a fast of commensurate duration.

Briefly, the entire question might be summarized as follows. All wild creatures are pawns in Nature's game, as unaware of qualities, good or bad, as the sun of its benign effects, frost of its destructive powers. That high characteristics exist in birds and beasts is unchallengeable. They are, however, unrecognized and uncultivated by the animals themselves. They are spontaneous in their operation, for which the creature possessing them claims no credit, nor can it incur blame if they are lacking. Like the seasons, fair or foul, each creature merely fulfils the purpose of its existence, the wild offering little scope for individualism. Originality of necessity involves departure from custom, and in Nature's scheme custom is rule. If every creature pursued its own line, developed individual qualities and embarked upon actions

inconsistent with its own appointed rôle, chaos would be inevitable, for the natural system is an infinitely delicate machine, elaborated in every minute detail, and the more highly developed an organization may be, so much greater becomes the need for absolute uniformity. In view of this, it is difficult to understand the prevailing desire to "humanize Nature", or the disfavour with which any reference to the automatic character of wild procedure is apt to be regarded. The animal is no less admirable because his part in the pageant is played involuntarily, or unconsciously, any more than a flower loses beauty from being inanimate. The interest, indeed, is rather enhanced than otherwise, for the workings of instinct are, if possible, more remarkable than the exercise of intellect. There would be little wonder attached to the migration movement were the birds provided with map and compass. Achievement in defiance of limitation, perfection without tuition, and conformity to law without visible coercion or restriction, constitute a state of affairs no less remarkable, although in no way comparable with human life, even when the latter has attained the very acme of civilization.

CHAPTER V

ANIMOSITY

PERHAPS the most conspicuous effect of civilization or education—to all intents and purposes the same thing—is the regard for life, this being a consideration that plays no apparent part in the natural kingdom, and is therefore entirely foreign to the animal outlook. Among wild animals as a rule antipathy results in one of two courses, either withdrawal from the object of aversion, or attack with intent to destroy, the line adopted depending upon the character of the animal concerned or that which inspires the aversion. There are always instances in which fear is more powerful than repugnance, or when attack is contrary to the instincts of a creature that is peaceably disposed, in either of which events the field is surrendered. When no active fear exists, however, and neither animal is inclined to the line of least resistance, there ensues a phase of that state of affairs frequently misnamed but generally described as “Nature at War”.

Aggression may be rendered necessary in the interests of defence, or by the desire to obtain possession of food or territory, in either case

precipitate retreat usually satisfying the aggressor when the main object is attained. If an animal attacks from motives of pure animosity, it does so with intent to kill. Should it fail to achieve this end, it is through inability, either due to its adversary's superior agility, or to indolence when the effort required proves too great. It knows neither tolerance nor mercy, and, whenever possible, pursues victory to extermination. Such is the natural fighting spirit, inherent in primitive man or beast. Whether the attack is provoked or otherwise matters nothing, nor, in this case, whether racial animosity is, or is not involved in the question. A domestic animal will destroy one of its own companions without compunction and without the incentive of resistance if the creature assailed is unable to make its escape. Dairymen, when arranging the order of their cows in stall, are under constant necessity of placing the weaker animals in such a manner that the horns of their neighbours can do them no serious damage. If this precaution is neglected, the consequence is frequently fatal. With kennelled hounds or other dogs there is always the same danger, and this tendency applies to all animals that occupy common quarters. When constructing a field shelter for horses or young stock, it is advisable to allow an outlet at either end of the building, in order that an animal may make its escape if set upon by its fellows. In this case, however, it amounts

to an example of mere bullying carried to an extreme, and in some instances, no doubt, to a sudden access of viciousness or ill-humour upon the part of an individual, the incident having little connection with natural enmity, as evidenced in the relations that exist between distinct races of animals, and for which there is no apparent reason, unless it can be found in that same vast, intricate system known as "Nature's balance".

"Natural enmity" is one of the many terms that has dropped into almost general misuse, being too often applied to the relations that exist between animals such as cats and mice, or pine-martens and squirrels. A mouse is not a cat's natural enemy. It merely constitutes the particular variety of flesh for which the carnivorous animal has a peculiar predilection. Their attitude towards one another consists, not of mutual antagonism, but of keen desire opposed to mortal fear. Enmity involves a "fixed and rooted hatred", which can scarcely represent the mental standpoint from which a rapacious animal regards the creature upon which it desires to prey. The sportsman does not consider a pheasant in the light of an "enemy", though he strives his utmost to cut short its career—with a further view to its ultimate utility for table purposes; and the simile serves to depict the attitude of any hunting animal towards its favourite game, with the sole difference that the ensuing meal

figures more conspicuously in the calculations of the rapacious beast or bird.

In the case of the hunting animal, one cannot draw a distinct line of demarcation between the killing merely for food and the desire to pursue and destroy for no other motive than racial animosity. Hounds will eat with avidity a fox that they have killed, but this, it should be remembered, is an acquired rather than a natural taste. Irrespective of any such consideration, foxes and dogs provide a typical example of natural or racial antagonism. A year or two ago, I was interested in observing the behaviour of a Labrador when by chance he disturbed a fox among some rushes in a Dartmoor swamp. As the retriever was then ranging unrestrained, one might have expected him to chase the fox as if it had been a hare or any other wild creature. On the contrary, he stood still and growled at the retiring russet shape, obviously recognizing in the strange animal—the first of its kind that he had seen at close quarters—not so much a possible quarry as an enemy. Quite recently, again, when hunting, I met a countryman who assured me that a fox had crossed the lane that we were following within the past few minutes. He had not seen the animal, but his sheepdog had caught its line, and he was assured of its identity by the manner in which “the dog’s hair stivvered up.”

In the domesticated dog of the present day

this racial hostility has doubtless been fostered and encouraged to a large extent, but the feud is none the less ancestral. Between the wolf—the dog's wild brother—and the fox of more primitive lands the vendetta exists to a marked extent, and is frequently carried to a grim conclusion. Between the wolf and the dog and between the fox and the dog, friendship and even more is possible, under certain circumstances, despite the ancient blood feud. Between the wolf and the fox, on the contrary, truce appears to be out of the question, at least in the wild state ; and when a pack of wolves invades any new territory, its first task is to exterminate, not the game or cattle of the neighbourhood, but the foxes. So fierce, indeed, is the hatred that grey wolves and even coyotes entertain towards their diminutive relative, that very few foxes can exist in habitually wolf-haunted country.

To account for this curious circumstance, one can only suggest the ancient proverb to the effect that two of a trade seldom agree. The wolf, as the stronger animal, desires no poachers upon his preserves, and to this end he adopts the attitude of game-preservers the world over. This, again, may be the reason for the proverbial antipathy that prevails between the canine and feline races. The wolf and the lynx are sworn foes ; but a more remarkable example is seen in the warfare waged by the dholes, the intrepid

wild red dogs of the East, upon the larger *felidæ*. That the wild dogs hunt and kill the tiger has been frequently claimed, if not proved. That they hunt the panther and pursue the chase with relentless tenacity has been established beyond doubt ; a case having been recorded in which a pack of dholes mounted savage guard for a day or two around the tree in which a panther had taken refuge. Since the flesh of the big cat could scarcely have been the inducement with easier and more toothsome game available, one can only assume that hatred "enduring, deep and strong" was the governing motive. Very similar, up to a point, must be the attitude of a terrier towards a rat, although it is necessary to discriminate carefully between the mental outlook of an animal that kills from motives of animosity and that of the natural killer—a hunter by instinct—who destroys everything that he is capable of overpowering. That, however, is beside the immediate issue which rather concerns the psychological bearing of one race of animals towards another.

Some years ago an article upon the problem of scent was submitted to me for criticism. In all probability it never achieved publication, but it was none the less interesting, the writer classifying the scents of various beasts and birds into groups, each of which, for elucidatory purposes, he represented as visualized in the hunting animal's mind by some colour. Though

somewhat fantastic, the idea serves to illustrate the point as well as anything that could be devised, for there can be little doubt that every scent affects a beast of prey in a particular manner. The sportsman who takes a sympathetic interest in his dogs and their manner of working can soon determine by their behaviour the character of the game that is afoot. This constitutes an invaluable point in huntsmanship in those parts of the world where the same hounds are employed against almost any quarry, whether wolf, fox, hare or deer. A few notes from an old hound should suffice to impart all the information that an expert huntsman desires concerning the identity of his game. By way of example, the note which proclaims the finding of a hare or deer may be jubilant enough, but it lacks the fierce challenge, the "ring of hate", or as an old huntsman once described it, the "spitish" character which indicates racial hostility as well as sheer joy in the impending chase. It should further be remarked that hounds accustomed to run either fox or hare will almost invariably forsake the latter in favour of the former whenever the chance occurs. The preference is indubitable, and this is the more noteworthy since, from a purely natural standpoint, one might expect there to be a decided predilection for the more edible animal.

The extent to which the same principle applies to rapacious birds is a difficult question, avian

psychology differing in so many important respects from that of beasts. Observation, however, rather inclines one to suggest that actual vendetta or racial animosity is not so general in the feathered world, if one excepts the state of perpetual warfare that exists between the strictly rapacious varieties and the remainder of the avian race. This, it should be emphasized, is not merely a case of hunter and hunted, since the conditions are frequently reversed, small birds when mustering sufficient numerical strength, not hesitating to take the offensive against a hawk, while the larger species, such as ravens and crows—themselves carnivorous, although in a somewhat different category—boldly engage and as often as not triumph over even the mightier *raptores*.

As a general rule, game birds, pigeons and the small members of the plover family are peaceably disposed, almost to the extent of helplessness. Although physically capable of defending themselves against many of their feathered enemies, they seem to be unable to take joint action against even a comparatively insignificant aggressor. The sparrow-hawk that ventures to swoop at a mob of starlings frequently gets the worst of it, yet the same bird might hurl himself into an immense "wing" of golden plover, or—more remarkable still—a dense host of wood-pigeons, and strike down his victim without the slightest risk of reprisals. By some curious freak

or perhaps deliberate provision of Nature, it would seem that the more edible the bird the more pronounced his inability to defend himself. However that may be, the warrior birds of the great family of *charadriidæ*, notably the oyster-catcher and the lapwing, certainly constitute two of the species least suitable for table purposes. These birds have long appointed themselves patrols of the nesting-grounds, resolutely attacking anything in the shape of winged marauders ; while the milder members of their order live securely under the protection thus afforded. It might be argued that these birds, being among the largest, are naturally the boldest. There is no relevance, however, between size and courage, of which the ferocious little sparrowhawk, as compared with an eagle, provides an apt illustration.

The pugnacious behaviour of ravens towards other birds, particularly carrion crows which endeavour to invade their nesting area, does not constitute a case of racial animosity, being merely an assertion of the instinct to defend eggs or young common to the more intelligent birds during the breeding season. Comparatively speaking, the robin is quite as aggressive in this respect as any king of the feathered race, his ferocity extending not only to alien species but to members of his own kind. For that matter, most birds are more antagonistically disposed towards members of their own race than indi-

viduals of other species. Gregarious creatures, needless to say, are outside the argument, but there are birds, such as the song-thrush, eminently peaceable by nature, that readily suffers any company at a bird-table or other joint feast except one of its own kind. It will make no protest when joined by finch, robin, starling or blackbird, but no sooner does another thrush approach within a prescribed distance than it assumes a bellicose attitude, crouches like a lion when about to spring, and, unless the newcomer withdraws, proceeds to active aggression. It is a somewhat curious fact that almost all birds take exception to the pied wagtail. To a robin the mere sight of this eminently inoffensive neighbour is the signal for fierce assault, and when a wagtail visits a common feeding-place in winter, it is constrained to snatch periods when no other bird is in evidence. The only reason for this general attitude that one can suggest is the wagtail's somewhat outstanding appearance, which, suggesting the abnormal, provokes the unaccountable but characteristic hostility of other wild creatures. In the robin's case, the question of rivalry in the matter of nesting-sites may be a contributory factor, their mutual requirements in this respect being very similar. One might, indeed, compare their position to that of magpies and kestrels, the feud in neither instance being confined to the breeding season, though possibly dating from and origin-

ating in that period, when the clash of interests may conceivably create "bad blood".

The question as to whether any bird identifies the species of another as distinct from the remainder of the avian race, is interesting. Do they, one wonders, entertain definite ideas as to the individual character of every bird? Or is there merely a broad distinction between foe and neutral—there being, with a few exceptions, no such thing as a "friend" in the wild? One would like to know whether the magpies that mob a kestrel discriminate in their own minds between the little red falcon, who is so fond of annexing their nests, and the less distinctive sparrow-hawk, who is not above following the kestrel's example in this respect upon rare occasions. One seldom sees them mobbing a sparrow-hawk; but this circumstance is not unaccountable, since the grey robber of the hedgerows and underbrush rarely affords an opportunity. He does not advertise his whereabouts by poising in the most conspicuous place, as though courting observation, and when by chance he encounters a magpie or jay—the latter being the magpie's staunch ally—in some quiet corner of the woods, that bird, if wise, adopts a "safety first" policy without lingering to summon acquaintances.

That small birds possess little power of discrimination in this respect is obvious from the manner in which they mob a cuckoo. One is

sometimes inclined to wonder, however, whether this is indeed a case of mistaken identity, or yet another example of hostility displayed towards the abnormal. A nightjar that ventured forth by day would certainly fare no better than a cuckoo. In all probability it would be mobbed, if not destroyed, by other birds ; creatures of the daylight displaying a confirmed aversion to nearly all nocturnal animals. This is the only apparent reason for the bitter and active hostility that certain birds evince towards owls, resulting in that remarkable pastime which can only be described as " owl-baiting " which anyone who spends much time in the woodlands cannot fail to have witnessed. It would be interesting to know how a woodcock would fare if discovered, by a troop of exploring jays and magpies. One cannot think that they would allow the odd-looking, mysterious stranger to remain unmolested ; but the accident of his discovery never seems to occur, or, if it happens, one is not afforded an opportunity of observing it. One sees neither a woodcock nor a night-jar under circumstances when diurnal birds might be expected to take notice of them, and it is not unreasonable to suggest that a desire to avoid their feathered neighbours has something to do with the marked aversion to daylight shown by both these species, their abnormal appearance rendering them peculiarly liable to attack.

The rooted avian dislike of nocturnal crea-

tures is not extended to birds only. The fox or cat that ventures forth upon its peregrinations by daylight is speedily detected and denounced, and this is probably the reason for the otherwise unaccountable antipathy that induces a flock of rooks to follow the movements of a fox across miles of open country. Rooks can cherish no personal enmity against a fox, since only by accident could he possibly be in a position to harm one of their number. They appear to recognize him, however, as an animal who, under ordinary circumstances, should not be abroad upon the sunlit landscape, and it is further apparent that they distinguish him from the roving sheepdog whose cross-country course would arouse neither interest nor protest.

In the great majority of instances, aversion upon the wild animal's part is passive, those creatures which dislike their neighbours adopting the sensible course of seeking fresh quarters. In this connection, not the least interesting example is that provided by the hare and rabbit problem. It is commonly believed that a strong racial antipathy exists between these species, closely akin as they are in many respects. There is a convention—not entirely justified—to the effect that these animals never occupy the same ground in any considerable numbers, some sportsmen attributing this circumstance to aggression upon the rabbit's part, others to the more fastidious hare's possible distaste for land tainted by

abundance of rabbits. From time to time I have set forth various points of view upon this subject, but have never as yet been able to arrive at a definite conclusion as to the existence of the antipathy in the first instance or, assuming the latter, the manner in which it takes active form, together with its effect upon the animals concerned. Up to a certain point there can be no doubt that the problem devolves into a mere question of habitat, either animal preferring, as a rule, conditions that are eminently unsuitable to the other's economy.

In debatable questions of the type, one of the main difficulties lies in determining between cause and effect. That the coming of the one animal frequently coincides with the passing of the other there can be no doubt, and it appears to be the rabbit that usually remains in possession of the ground, being obviously the more tenacious. Upon the other hand, in localities that have been almost denuded of rabbits within recent years by the assiduity of professional trappers, the hare has in certain cases reappeared, the larger animal establishing itself in districts which it had not inhabited for years. In this connection a somewhat interesting point arises. Assuming the banishment of the rabbit to be the cause of the hare's return, how does the latter become so quickly aware of the circumstance? In a recent instance, the scarcity of rabbits being purely local, the hares must have

crossed miles of rabbit-tainted country, where their own species was comparatively unknown, before discovering the vacant territory. Was this yet another case of cryptesthesia, or one more instance added to the long list of accident or coincidence?

I have frequently advanced the theory that the rabbit-trappers who take so disastrous a toll of wild pheasants and partridges have been responsible for the disappearance of the hare in many localities; but the question may not be disposed of so easily. Recently I received an interesting letter upon the subject from a veteran sportsman living in the Crediton district. He wrote as follows:

“In my early youth, say, 1860, there was not a rabbit to be seen between Creedy Park, near Crediton on the east, and Bow on the west, a stretch of agricultural land with fallows and sand-bank fences, well brushed. I can remember being taken a ride of some miles to see rabbits feeding in a park, and in the district there were three packs of harriers.”

He proceeds to relate how, at the instigation of one or two tenants, a local squire turned down twelve couples of imported rabbits with a view to obtaining a greater variety of sport. Their descendants promptly spread over the entire district. The hares as speedily disappeared, necessitating the disbanding of the harrier packs in consequence. Within a comparatively short period the banks became honeycombed with deep burrows, and the rabbit population consti-

tuted a nuisance, resulting in the employment of trappers. The latter, however, were not requisitioned until the banishment of the hare had long been accomplished. Since the period described, the rabbit plague has been suppressed to a large extent, and the hares have returned to many of their old haunts, though scarcely in their former numbers. Cause and effect appear to be sufficiently obvious in the foregoing instance, and I have no doubt that many sportsmen could describe similar experiences. There are two adjoining farms in the Haldon area very similar in soil and in general character. Upon one of them rabbits are abundant, but hares never seen. Upon the other, hares abound, but the rabbit is absent. This, together with the preceding statements, might be taken as proof positive of the racial antipathy between the species, were it not for the fact that in certain localities they undeniably not only exist but thrive in company. One could mention many places where such conditions obtain.

To an involved riddle various solutions might be suggested. The hare dislikes the rabbit and avoids him as a neighbour—when possible—that is to say, when it can find ground untainted by rabbits, shifting its quarters now and again for that purpose. Upon the other hand, when conditions are eminently suitable for both animals, and rabbits abound over the greater part of the surrounding country, the hare pre-

fers to tolerate his plebeian relative rather than emigrate to distant pastures. As a general rule hares multiply as rabbits decrease for the cogent reason that the decline of rabbits means fewer traps, fewer guns and fewer stoats, for the stoat follows the rabbit as the partridge follows the plough.

Perhaps, then, after all, the entire problem is capable of one simple and natural solution. Rabbits constitute the principal prey of rapacious animals, particularly of the weasel family, and the appearance of the highly edible rodents in any considerable numbers is certain sooner or later to be followed by an influx of stoats and—in those localities where such redoubtable hunters still exist—polecats. Before the advance of so formidable an invasion the timid hare might well retire or succumb, the latter being more probable. Young leverets would fall easy victims and a heavy toll taken of the young quickly affects the status of a race whose adults also are easily destroyed. Upon marshy or low-lying land, where hares are most abundant, the stoat is, as a rule, only sparsely represented, while the scarcity of rabbits in any district usually serves to discourage his presence. In such localities, therefore, the hare may enjoy comparative immunity from his persecutions. In any case, the rabbit would still be the cause of the hare's banishment, but only indirectly, while the comparative abundance of both animals in given

districts might be attributable to a freedom of those particular places from stoats, an effect produced, perhaps, by the activities of game-keepers. Otherwise it is difficult to reconcile a more or less generally admitted rule with outstanding and indubitable exceptions.

Coincidence, again, must also be taken into account together with the natural sequence of events such as the conversion of ploughland to grass, or the reclaiming of marshy wastes and similar developments ; for nothing affects the fauna of a locality more certainly than any material change in the character of the land.

Organized active hostilities upon a large scale between distinct races are practically unknown in wild life for obvious reasons. Large assemblies of birds are seldom aggressive towards other species, while beasts, as a rule, combine for no other purpose than hunting, except in certain circumstances which will be dealt with in a subsequent chapter upon co-operation.

It is also doubtful whether many animals possess sufficient discrimination or power of concentrated purpose to cherish deliberate animosity against a human individual. If so, when dislike takes active form, it would only be of the most direct kind. The story of the vixen who, after losing her litter, promptly executed a destructive raid upon the turkeys of a neighbouring farmer, until then immune from attack, may be true in the underlying facts. Deliberate

vengeance was certainly not the motive, however, since in the mind of the fox the birds would stand in no relation to the destroyer of her cubs, pure mischance alone being responsible for her action. Rendered savage by her loss, she might conceivably wreak her rage upon the nearest object, but one may doubt whether any impulse other than the hunter lust was at work. Premeditated reprisals are probably unknown in the wild.

There is a grim story of a camel that under cover of night made a murderous attack upon an unpopular driver, and one might add the fully authenticated instance of a bull that waited his time and at last took terrible vengeance upon a brutal attendant. In the latter case, however, there is lacking the proof of premeditated intent. Of the man's cruelty, and subsequent fearful death under the hoofs of the bull, there is no doubt, yet another might have suffered the same fate had the fierce animal been disposed to attack. That the victim happened to be the man who had, with good reason, incurred the bull's animosity may have been purely incidental. The natural ferocity of such a beast would probably be directed against benefactor and enemy alike.

Very different was the case of a man who aroused the hostility of the brown monkeys which occupied the jungle surrounding his bungalow in the neighbourhood of Calcutta. For some time he had been troubled by their predatory propensities, and at last in desperation

ambushed and killed one of the culprits. The experiment proved an entirely successful deterrent as far as pilfering was concerned, but during the days that followed the man lived in a literal state of siege. His mere appearance outside the building invariably provoked so furious a demonstration upon the part of the simian community that he dared not venture forth for fear that more active measures would be adopted against him. Other people might come and go unmolested, the monkeys evidently entertaining no doubts as to the identity of the object of their resentment.

Similar instances are by no means rare, and in their ability to discriminate monkeys appear to differ from the majority of animals whose vengeful attack, when directed against human beings, is usually delivered irrespective of individuality. The wounded buffalo cares little whether he destroys the man who fired the shot or another: anything in the guise of an enemy serving as an object for his rage. It is the unoffending passer-by who sustains the attack of wasps infuriated by the boys who have fled. Indeed, animals when out of temper are no more reasonable than human beings, while in the matter of natural antipathies, the main difference between man and other living creatures lies in the fact that in the one case likes and dislikes are restrained by convention or law, in the other they are at least undisguised if not always allowed unbridled rein.

CHAPTER VI

FRIENDSHIP

FROM the subject of animosity one passes automatically to the sociable side of animal nature. Of this one reads and hears remarkable instances, but, unfortunately, they seldom occur within personal experience. The case somewhat resembles that of the mutilated Belgians in the early stages of the Great War. They were always to be seen in the next village, but never in the particular place where one happened to be. Almost anyone with extensive experience of animals can recall numerous instances in which creatures naturally inclined to antagonism have maintained amicable relations in the domesticated state. This, however, is merely the result of custom, the more aggressive animal having learned to respect the other's right of existence. One of the most pugnacious and unreliable dogs ever known once cultivated the habit of playing with a young kitten, and when so employed, nothing could have exceeded her gentleness. There could be no doubt, however, that had the dog been given the slightest encouragement to act otherwise, the game would have assumed a very different aspect, and had

the two animals been left alone together for any length of time, the kitten would not have survived. There was, again, the case of a common wild rabbit, which, caught when very young, became so tame that it was allowed to run loose in its captor's house, maintaining apparently friendly relations with the various dogs about the place. One need scarcely raise the question as to how the dogs would have dealt with that rabbit had they encountered it when pursuing their own devices beyond the charmed circle of the house and its environment. The rodent, beyond a doubt, would merely have suffered the customary fate of its kind. Outside its usual setting its identity as a privileged individual would have ceased to exist, and the superficial character of the "friendship" been established by tragic proof.

Between *wild* creatures of distinct species one may go so far as to assert that friendship in the literal sense is impossible, since it would necessitate deliberate effort upon the part of at least one of the animals concerned to adapt its outlook and habits to those of the other. Instances of tolerance for the convenience of one or both creatures are not rare, the example of the rhinoceros and the *buphaga Africana*, or that of the osprey and grackle, being characteristic. In each of the given instances, the attitude of the weaker creature resembles that of the gull when following the plough or fishing-boat, or the

behaviour of the jackal in following the lion. Whether the motive happens to be food or tangible advantage in any other form matters nothing. The stronger "partner" in these odd associations is probably indifferent to the other's presence, or accepts it as a nuisance too negligible to warrant elimination. So far as the rhinoceros is concerned, the situation might be one of tacit co-operation, the cumbersome beast deriving considerable relief from the removal of an irritant of which it is otherwise unable to divest itself. The position is by no means unique, since many birds, notably egrets, purple-backed herons and starlings, perform a similar office for cattle or sheep, the long bills of all these birds being naturally adapted to such work. Whether the beasts are always willing participants in these transactions, or realize the benefits conferred, is another matter, since the offices of the benefactor under certain circumstances, such as the removal of a tick, might not necessarily take the form of painless extraction. A dog readily submits his person to a vermin-hunting monkey's scrutiny, and it seems probable that as a general rule the remedy is preferred to the complaint.

"Friendship" involves the interchange of ideas and sympathies, together with the sharing of experiences, all of which is scarcely feasible between two animals, particularly when of different races, and in consequence possessed of few mutual, and possibly many diametrically

opposite, tastes and instincts. And yet, curiously enough, the stock stories of intimacy between animals more often than not relate to creatures as dissimilar in habits and outlook as a horse and a dog, a cat and a mouse—to mention only one or two of an almost countless list.

The numerous instances that can be accounted for by probable misrepresentation, or those which are capable of simple explanation, may be dismissed without comment, being as a rule sufficiently obvious. There are others, however, based upon facts that are admittedly curious, and these require closer attention. The narrative in almost every case runs upon identical lines. The incongruous companions are inseparable. One dies; the other pines, “refuses food”, and soon follows its friend to the shadowy hunting-grounds. In the case of captive birds or beasts, the solicitous attendants do everything within their power—short of supplying the bereaved animal with another companion, which course would probably effect a cure in those instances where loneliness is the actual cause of death and not, as doubtless happens frequently, disease contracted from the dead “friend”. The majority of animals are gregarious at heart, and if unaccustomed to the solitary state, may conceivably pine if suddenly deprived of the companionship to which they have been accustomed. It is largely a matter of habit. Missing the animal that has gone, as one might miss a

familiar piece of furniture, the survivor is conscious of loss, uneasiness of mind being followed by failure of appetite and consequent rapid deterioration in health. Almost any departure from its customary manner of life might easily have the same effect, for, as previously remarked, when dealing with the hare and rabbit problem, there is no factor more disturbing to animal habits and economy than change. The felling of a few trees may serve to expel the occupants of some historic rookery. The clearing of a covert may cause red deer to abandon a considerable tract of country, while birds may be driven from favourite nesting-places by the erection of a new building, or even by some slight natural development. Of this a recent example has been provided by the golden plover upon Dartmoor. Owing to the excessively wet conditions that prevailed during the summer of 1931, green growth was abnormally prolific, and many hillsides, usually barren and favoured in consequence by the plover, in early winter were so thickly carpeted with coarse herbage that scarcely a bird would alight upon them.

There is, perhaps, too great a tendency to confuse force of habit and the mere desire for physical comfort with affection ; the attachment of a cat for its home or to the knees of some particular individual constituting an apt example. By such means a "friendship", typical of the incongruous instances so often related, might

easily spring up, and this, after due allowances have been made, provides the explanation in the vast majority of cases. Briefly, the matter amounts to this : so-called " friendship " between animals is either a matter of habit and association, or mere assertion of the gregarious instinct. That animals crave the companionship of one another is, of course, obvious. A horse or a bullock always remains more contentedly in a field where other beasts are confined, while animals of the same species not infrequently display amity within definitely prescribed limits. Dogs will play, work, or hunt together, the last-named proceeding requiring a certain amount of mutual understanding and sympathy. One has known, upon the contrary, sporting dogs, well accustomed to one another and living upon amicable terms, who could never be prevailed upon to co-operate for field work, members of opposite sexes usually providing the most satisfactory combination for this purpose, although a young bitch, when hunting, is liable to follow every movement of its mother from force of habit.

That a higher degree of natural intelligence involves a greater capacity for friendship goes without saying. For this reason, the dog, being one of the most intelligent animals, is eminently companionable, either to its own kind or to man. Dogs undeniably display both preference and affection, yet even in the exercise of these qualities there is an indubitable mingling of

“habit”. As often as not this latter factor is responsible for canine fidelity to an individual. A dog follows the person whom he accompanies by custom. As a general rule he soon adapts himself to a change of owner, and though he seldom forgets, his affection, if so it may be termed, is readily transferred with his allegiance. The animal that actually pines for a master lost is seldom encountered in real life. In many cases a dog’s fidelity is such that he will accompany one individual only as long as he remains within that person’s influence. When the latter is withdrawn, however, the animal being no longer offered choice of service, adapts himself to changed conditions. Indeed, the attitude of a dog towards his owner much resembles that of a small child towards the people in whose charge it is placed. Affection, co-operation and allegiance are won or lost in a precisely similar manner. Each is adaptable to circumstance or personal influence, although in the matter of adherence to place or individual, habit figures more definitely in the animal outlook. The trick that certain dogs acquire of hunting in couples cannot be regarded as indicative of canine friendship towards one another, or even companionship, being probably nothing more than a survival of the old pack instinct, which among dogs and wolves yields precedence to no other impulse or influence with the inevitable exception of the mating instinct.

By far the greater number of animals possess strong social inclinations, and the circumstance is the more curious since the bare fact of proximity to others carries no apparent advantages. Moorland cattle or ponies, for example, hold no visible or audible communication with one another—except when separated. Yet the distress displayed by any beast that finds itself detached from the herd is pathetic to witness. Again, the presence of others of its kind has a reassuring effect upon almost any animal, for which reason several beasts are always more manageable than one. To drive a single sheep or bullock in any given direction is no easy task. The agitated creature is tolerably certain to break away upon every possible occasion, even when following a prescribed track along which a flock or herd will proceed without giving the slightest trouble.

So far as a human being is concerned, there can be no denying that the shortest road to a wild creature's friendship lies through the bestowal of food. None the less it is equally true that birds and beasts appreciate human companionship, but this as a rule only applies within strictly defined limits, since the tamest bird almost invariably prefers the society of its own kind. For example, the semi-domesticated robin that is so frequent a visitor at the window-sill or even to the interior of the house during the autumn and winter months, is not necessarily

actuated by purely gastronomic motives. True, he appreciates the crumbs or meal-worms upon which he is regaled, but these as often as not constitute a secondary consideration. In many instances a robin that has never been fed by human beings is almost as friendly as the window-sill "pensioner". His behaviour is plainly due to nothing else than a companionable disposition; but, in any case, the tamest robin abandons his human acquaintances when the first breath of spring suggests other interests and attractions away among the fields and hedgerows. The same rule applies to practically every animal, whether wild or domesticated, with the notable exception of the dog, and even in the latter instance it is an open question whether the remarkable attachment displayed by this animal towards mankind may not, after all, be a highly developed and intensified example of the gregarious instinct.

Almost every member of the dog family is at heart sociable. Wolves, wild dogs and jackals possess this tendency to a marked degree, while even a fox by disposition is far from being the solitary bandit into which he usually develops through force of circumstances. In the wild state foxes appear to seek rather than shun the society of one another. Litters of cubs remain more or less together until scattered by some upheaval in the normal tenor of their lives; and nobody who has listened to the weird "sing-

song " that takes place at times under the early November stars, or in the calm of a mild February evening, could entertain any doubt as to their sociable tendencies. An owner of a tame fox knows how readily the little alien accepts the companionship of any dogs belonging to the establishment, when these have been likewise induced to forget the ancestral animosity. There was one well-remembered animal, a little three-year-old vixen, who periodically escaped to the near woods or brakes, but for years was always recovered without difficulty by the simple process of taking out the three dogs with whom she lived. No matter where she had taken refuge, she never failed to come out to rejoin her playmates, with whom she returned to the common kennel—a willing captive.

Another example is that of the common prairie wolf, or coyote. These animals do not range in large packs like their grim relatives the grey, or timber wolves. None the less, it is the rule rather than the exception for two or three to roam about in company. The coyote, indeed, hates to be alone, and when he finds himself in so unenviable a state, his first business is to ascend the nearest mound and announce his solitary state for the benefit of any listener who may be similarly placed. For the animal, generally speaking, any companionship appears to be better than none, and, failing the society of its own kind, a beast or bird that for some

reason becomes separated from its fellows will attach itself to almost any party that will tolerate its presence. There are certainly creatures of solitary habits that do not congregate in flocks or herds. These, however, usually consist of those animals which pair for life, thus mitigating the loneliness of their lot. Others, again, who lack the gregarious instinct escape the long period of solitude by hibernating, going into winter quarters soon after the family party has been finally broken up ; and one may safely assert that comparatively few creatures that remain active during the winter rest content with their own company. For the animal, even as for man, it is not good to be alone. It will be noticed, moreover, that solitary animals, like solitary human beings, are almost invariably morose and, in the animal's case, frequently savage.

Upon the whole, perhaps, birds are more sociable than beasts. When a woodpigeon sees another perched in a tree he immediately alights beside it, for the same reason that brings ducks down to the painted decoys on the water. Gulls of every description, with the whole extensive coast-line at their disposal, will crowd upon a ledge of rock that barely affords standing-room. Swallows a-row upon a telegraph wire are invariably joined by others that may come along, and even birds, such as woodcocks which are solitary by nature, appear to join forces

more or less before embarking upon their adventurous flights from coast to coast. Not the least interesting point in connection with wild bird study is the manner in which they pack together at migration time. Why, one wonders, is the great adventure undertaken as it usually appears to be, in such immense companies? The magnitude of the feathered host provides no security to individuals, since the misfortunes of a unit are disregarded by the whole. The greater the numbers, again, the more conspicuous the flight, entailing enhanced dangers from enemies of every description. Is it yet another case of companionship imparting courage? It seems at least possible that the bird, impelled as it is by the urge of the migrating instinct, dimly realizes the magnitude of the undertaking and shrinks from facing the numerous terrors of the vast skyscape unfortified by the presence of fellow-adventurers. In what light, one wonders, does a bird regard its companions in peril, and how far is the assembling of such countless thousands at migration time the result of conscious purpose? It is, at least, conceivable that the numbers may be united merely by force of common intent, assembling at some vantage-point to await conditions favourable for departure in the same manner as a human crowd gathers to embark upon a train or steamer.

More important, perhaps, is the question as to the impulses that prompt resident birds to

pack together during the winter months. It cannot be a case of common need, since both purposes would surely be better served were the birds content to wander about singly or in small companies. Practical advantages, indeed, there are none ; and unless a common attraction to certain areas where food is likely to be found or climatic conditions are favourable constitutes the true explanation, one can only suggest that the social impulse must be strong enough to outweigh the obvious drawbacks arising from excessive competition for commodities that cannot be unlimited. In this respect, perhaps, the mentality of the wild creature most closely approaches that of mankind.

•

CHAPTER VII

CO-OPERATION

THERE is no sphere of animal activity that offers wider scope for speculation than collective action. In its ability to co-operate, beast, bird, or even insect appears to display powers of comprehension, if not of intellect, that perhaps more closely resemble the human outlook than is suggested by any other line of conduct adopted by animals.

Among wild creatures co-operation is undoubtedly the outcome of numerous instincts, or, more literally, an accumulation of instincts so highly developed throughout the course of ages that routine of procedure has become habitual among certain communities, each individual acting its own part automatically, and, almost certainly, with little personal idea of ultimate effect.

It is somewhat remarkable that the most notable examples of community work are to be found in insect life, among creatures so minute that their intellectual abilities, like their anatomies, almost require examination under a microscope. As a typification of collective industry the ant is proverbial, but the most simple experiment suffices to prove how large a part

instinct or habit—whichever term is preferred—undoubtedly plays in the system that governs the existence of these little creatures. The conventional order of an ant's life is eminently methodical, and the insect is prepared for every exigency that arises in its normal routine. With an abnormal occurrence, upon the other hand, the ant is incapable of coping. It evinces no sense of originality, and its attempts at co-operation with its fellows when confronted by sudden emergency must strike the casual observer as inefficient in the extreme.

When a stone that shelters a little ant colony is suddenly removed, wild panic reigns, as in a human community that is faced with unexpected and overwhelming calamity. It is obvious that the insects experience no fear after the manner of mankind, since no attempt is made at actual escape. If they realize the arrival of the human intruder, they probably regard the living mountain in the light of some extraordinary upheaval of Nature that has materially affected the character of the landscape. It is with the latter effect that they are concerned. Their world has been revolutionized at a stroke. They realize that their eggs are exposed to the daylight and should be removed without delay. Being instinctively prepared for the attack of some ant-eating creature, they set to work to achieve the desired end. Their methods often suggest confusion rather than organization ; none the less, within

a comparatively short space of time every egg has been removed to some depository designed for its reception. For this exigency, being natural up to a certain point, they are prepared. It is with the unexpected that they seem unable to cope.

Very different is the impression if one drops an edible fragment in the midst of an ant community. It is promptly annexed by the nearest insect who endeavours to remove it, but soon finds the task beyond his capacity. He is joined by another, and one's first natural impression is admiration for the sagacity of these minute creatures which are thus capable of rendering one another assistance. Then, perhaps, one perceives that the "assistance" is far from being all that could be desired. Each insect and any other that comes to participate appears to be directing its efforts from a different angle, and when at last the prize gets under motion, its course is too erratic to suggest either unanimity of purpose or even the existence of any purpose whatsoever. It is merely steered about hither and thither like a football in play, and as often as not eventually abandoned without any apparent effort having been made to convey it to a definite storing place. Crumbs are certainly removed at times, but the general tactics adopted are far from convincing. It may sometimes happen that the observer himself is obstructing the approved route, and the ants are unable

to adapt themselves to another. No attempt is made, however, to negotiate the obstacle, and the course actually steered is in any case sufficiently dubious to dispose of the suggestion that prescribed routes are necessarily followed. It seems more reasonable to assume that the prize is recognized as edible, and the desire to store it appeals to the community mind. Each insect acts upon the same idea, but precedent has not provided either for windfalls or collective transport, except under natural and conventional circumstances, and thus the attempt frequently ends in failure. The futility of collective action, therefore, when removed from the normal sphere is clearly demonstrated.

Ants certainly adopt aggressive tactics as most people know to their cost, but whether such action can be described as organized attack, so far as a human being is concerned, is open to doubt. Its motive as a rule is not defence, in which respect it differs materially from that of a wasp or bee, since these latter insects rarely sting unless provoked, or with a view to driving away an intruder. Upon occasions the female ant may use the sting with which her sex is provided for defensive purposes, but many varieties of these insects, like mosquitoes, attack in vast numbers and for the same reason—that of obtaining provender. They obviously find the recumbent human or animal form eminently edible, and direct their energies upon it, their

onslaught being rendered the more unpleasant by the use of formic acid, the injection of which lends additional point to their attack. Their onset is collective in every sense of the term, but only on account of its numerical strength. It no more imparts an impression of organization than the descent of an immense flock of woodpigeons upon a field. Motive and outlook, indeed, appear to be the same. Both birds and insects are seeking food, and communal feasting is the habit of each race. Every individual is satisfying its own appetite without bestowing thought upon any other consideration or ulterior purpose that may be effected.

Individual rather than communal defence or attack appears to be the way of an ant colony, even though the idea of co-operation is frequently conveyed by mass action in pursuance of a common idea, as when a plague of locusts ravages a countryside. This is a subtle distinction not always recognized when judging animal actions. For a more typical example of organization displayed by insects one turns to the bee. Upon its elaborate, social and industrial history there is no occasion to enter, but a less generally recognized habit of the species is worthy of mention, as being directly connected with the case under consideration. This is the bee's highly civilized custom of placing an armed guard at its main entrance when resident in a country where robbers abound. In lands where

wild bees are numerous a hollow tree is frequently occupied. A woodpecker's hole or a slit in the trunk may constitute the principal approach to the natural hive, along either side of which a row of sentinels stands like armed soldiers, keeping a close watch upon all comers. When a raider, intent upon a feast of honey, draws within a prescribed distance, the sentinels with one accord raise their wings, like troops presenting arms at the word of command. This is an obvious ultimatum which no insect and few small animals, whether feathered or furred, fail to respect. The would-be robber discreetly withdraws, and with the same unanimous action the guard once again "stands at ease".

One would like to know the means by which this system is regulated, from which section of the community the guard is drawn; whether it is self-appointed, and how relieved. It is possible that a certain number of insects, wearied from or disinclined for exertion, dispose themselves for the office. When one flies away another would take its place, glad of an opportunity to rest, like gregarious birds ranging themselves upon a favourite ledge or perch. A constant guard would thus be maintained, and the general purpose served, but once again by indirect means. The defence of the hive would constitute an attitude automatically adopted by all the insects without the need of definite instruction, while unanimity of action would

follow upon a common impulse to challenge an intruder at the precise moment that such a step became desirable. An imperceptible lead might even be given by the insect nearest to the danger, and in any case the ability to act in unity is the rule rather than the exception among all gregarious creatures. More often than not it constitutes the secret of wild "co-operation".

The communal life of gregarious animals and insects is a topic that has been exhaustively treated in so many scientific works that it is only essential to touch upon the psychological side of the subject. It is common knowledge that the population of certain species of insects is divided into separate categories or classes, individuals of which automatically fulfil distinct functions. That the entire communal existence hinges upon such organization is obvious, the one point in question being the extent to which each class actually realizes the effect of its own efforts and those of others upon the general welfare of the race. It may be assumed that each insect mechanically adopts the task for which it is designed, having no inclination to act otherwise, such things as class discontent or usurpation of another's province being products belonging to another type of civilization. But how far, one wonders, does one class *wittingly* depend upon another? It has been stated that when a shortage of any particular type occurs

in an insect colony, the remainder not only realize the deficiency, but concentrate upon the production of that category, paying special attention to the cultivation of the necessary eggs, until the desired balance has once again been restored.

This appears to constitute one of the numerous instances in which effect is more apparent than cause, and where deliberate motive may easily be ascribed to purely natural processes. Where consumption is scanty, supply naturally accumulates, and when the particular type of grub that subsists upon certain commodities becomes scarce, a glut of such commodities automatically ensues. That the few consumers would benefit from the abundance and thrive accordingly is obvious. It is also probable that the grubs are fed with the provender most easily obtainable, and, assuming that certain kinds of food produce certain grades of insects, it follows as a matter of course that an abnormal supply of such sustenance would result in a corresponding increase of that class of insect whose production it is supposed to foster.

It is clear that the eminently fundamental principle of mutual dependence or necessity, so often disregarded by humanity, is tacitly recognized among the lower forms of life. The obvious fact that co-operation proceeds upon uninterrupted lines, however, is no proof of perspicacity upon the part of the creatures concerned.

The response of each individual or each class to the actions of another is doubtless as mechanical as that of a plant to the fertilizing operations of the bee, which latter in itself is an unconscious agent. It is more than doubtful whether the most intelligent animal recognizes even the direct part played by another in any proceeding, beyond the extremely limited connection of association. A dog accustomed to rabbiting realizes that a ferret figures in the event, and the appearance of this animal would suggest the sport with which it is connected. Upon the other hand, the dog would not miss the ferret were the latter omitted from the customary paraphernalia, and would watch a hole into which no ferret had been introduced with the same eager anticipation.

Many dogs, particularly greyhounds or whippets, co-operate with a ferret in the most ingenious manner, canine experts at this craft being capable of competing successfully with skilled users of net or gun. When a ferret enters a burrow, the dog mounts guard outside and follows the sounds of subterranean activity in the direction indicated by its keen senses, seldom failing to intercept the rabbit when in the act of emerging. It is perhaps superfluous to remark, however, that the movements of the ejected, and not those of the ejector, occupy the listening dog's attention. Until a rabbit stirred, the ferret might pass from hole to hole without exciting

more than passing interest, its comings and goings having no more direct connection in the dog's mind with subsequent events than the cartridge in the gun.

The respective methods employed by dog and ferret are too dissimilar to permit of any degree of mutual understanding. There would certainly be none upon the ferret's part, although in the case of the more intelligent dog, long association might tend to a certain linking of cause and effect. It is in the pursuit of other creatures that animals display the most decided tendency towards combined effort, although as a general rule, alliances are seldom formed between distinct species unless man constitutes one party in the transaction. This is not remarkable since man, with his superior intellect, frequently succeeds in obtaining sufficient domination over the lower animals to convert their abilities to the furtherance of his own ends. Failing this power, a common motive is essential to render any form of co-operation possible, and this is the secret of mutual endeavour among birds and beasts.

Unanimity of purpose by no means necessarily involves partnership in the full interpretation of the word, nor does perfect co-operation as a matter of course embrace the "party spirit". Nations may combine to effect the overthrow of a common enemy only to wage bitter war upon one another when the primary aim is accomplished, while the first business of the treasure-

hunter of popular romance is to murder his confederates when the quest has terminated successfully. Upon the same principle, two or more rapacious animals may work together in perfect harmony to effect an end that neither is capable of achieving single-handed, although each and all have no other purpose in view than individual advantage. A pack of wild dogs when in pursuit of game displays generalship and finesse, the apparent intelligence of which seems little short of human, but it would be bold to assert that a single member has the communal welfare at heart. When the main pack divides for the strategical method of hunting known as "relay-chasing", the game might conceivably be overhauled by any one of the minor bands that take up the chase in turn. It is tolerably certain, however, that the successful company would not await a general assembly before proceeding with the feast. The dogs that actually pull down the hunted antelope would demolish its carcase without further preamble, and unless the supply happened to be considerable, the last arrivals of the widely dispersed pack would get little for their trouble. Honour among bandits may or may not exist where human outlaws are concerned, but it certainly does not figure in the animal outlook.

As often as not where gregarious animals combine to over-reach one of an alien or hostile race, the contest of wits and agility is *twofold*, so

far as the "allies" are concerned, for each is endeavouring to outwit, not only the common enemy, but also one another. Of this a somewhat amusing example is provided by the crows which wage an incessant campaign of organized robbery against the pariah dogs of the East. When one of the latter gaunt bandits secures a bone, he retires with his booty to some shady corner, only to be beset almost immediately by two or three of his black feathered rivals. They alight upon the ground—at a safe distance—and by dint of judiciously timed movements upon flank and rear endeavour to obtain possession of the bone. As one retires before the charge of the exasperated dog another advances, and the affair ends in the capture of the prize by some wily old rascal, who, stealing a march upon his companions and enemy alike, probably makes good his escape undetected by anyone.

As a general rule, when self-interest constitutes the principal motive of individuals participating in collective action, the common cause benefits rather than otherwise. When every member of a cricket team endeavours to score with a view to competitive average or aggregate, good totals are attained, and upon the same principle, when hunting animals combine, work is the keener, since each member hopes to secure the prize for himself. Self-interest forms a distinct inducement to prompt co-operation, when the latter, if successfully rendered, is likely to ensure a first

share of the spoil. The beneficial effect, moreover, is twofold, for individual success is essential to existence, and the survival of the fittest principle is maintained in consequence. Thus, once again, one is confronted with primitive motive and primitive law in operation, being indispensable to Nature's scheme, in which sentiment of any sort is neither possible nor desirable in the common interest.

Briefly, if pack co-operation among animals may be regarded in any sense as akin to "team work" in human life, it rather resembles that of the robber bands with which comparison has already been made. Support is loyally given as long as the chase lasts, but there is no equal distribution of spoils. It becomes a case of everyone for himself. There would be neither thought nor provision for the sustenance of members injured in the conflict and therefore unable to assert a claim. On the contrary, it has been stated that fallen wolves provide another course in the communal meal, although it is improbable that such an event actually takes place except in cases of extreme famine, for cannibalism is not the rule among wild creatures of a high intelligence. One hawk is not supposed to pick out another hawk's eyes, and so far as personal experience serves in such matters, the dead usually remain upon the field.

Perhaps the closest approach to actual alliance in hunting is provided by mated pairs of birds

or beasts. In such cases some measure of ultimate division is probably assured, although, even so, it is tolerably certain that the "master mind" secures the larger share. Snatch and grab would constitute the rule, and if the quarry, when secured, provided no more than a bite or two, it would probably find its way down one throat only. It is noticeable, however, that retrieving dogs usually surrender game to a lady of the race, and since the action appears to be natural, one may assume that the privilege of the sex is recognized in the wild, at least during the mating season when such a concession would be most desirable. It may be supposed that deliberate partition of food, amounting in this case to the feeding of one animal by another, or the procuring of supplies for common use, is confined to the nuptial season or state—the only time when such a line of conduct is essential for the welfare of the species.

Apart from motive, there remains the question as to the mental attitude of animals that act in conjunction with one another. Even when recognizing the competitive spirit and common interest, the forethought displayed and support given is remarkable enough to provide further food for thought. In this respect there is little to choose between any type of rapacious bird or beast. Whether one selects for consideration the Kassala deer-hounds at work upon antelopes, carrion crows attacking a rabbit in the open, or, once

again, wild dogs engaged in relay-chasing, the same points arise. Each animal appears to anticipate, not only the line taken by its confederates, but the movements of the game, and one can only conjecture the point at which deliberate calculation supplements that indefinable hunter instinct, which, operating in both man and beast, can only be described as cryptesthesia.

An expert rabbit shot, when at work under difficult conditions, such as in brushy country where a prolonged or clear view of the game is seldom possible, levies his charge, not *at* the rabbit, but at the spot for which in his opinion it seems likely to head. There is often no apparent reason why one particular run-way through bramble or fern should be selected in preference to another by the rabbit, nor is there a moment to spare for consideration, yet rarely indeed are the calculations of a really first-class man seen to err. Calculation is, perhaps, scarcely the correct expression, for he acts upon impulse, which, however, cannot in any sense be described as taking a mere chance. The decision, though instantaneous, is deliberate, the outcome of knowledge, innate as much as acquired, and this is probably the secret of the perfect unanimity that animals display in action. When a deerhound is correctly placed to intercept the antelope that its companion has turned, it does not necessarily follow that the game was wittingly driven

in the right direction by the latter animal. The circumstances rather suggest that the other dog is intuitively aware of the direction that the antelope *must* take as a natural consequence of the heading movement, and directs his course accordingly. Each dog, though acting in perfect unison with the other, is in reality pursuing its own game with precisely the same outlook and intent as children scrambling for coppers or sweets.

Upon the same principle, therefore, it is not difficult to imagine the mentality of the hunting pack working in relays through heavy jungle which provides the quarry with ample opportunity for twisting and doubling. When the hindmost animals find themselves at a disadvantage in the chase, they immediately endeavour to better their position. Of the probable line they are never in doubt, and abandoning their attempt to regain the lead by pace, they adopt the rôle of an ambushing party by dint of cutting obvious corners, or running back upon their own tracks, and thus intercepting the quarry, or, if it has already passed, reversing their original position, leaving the forestalled leaders to follow their example. That a common instinct serves as their guide is proved by the unanimous character of the tactics they adopt. The trick of "skirting", so deprecated in the modern fox- or stag-hound, is merely an assertion of the same instinct—a reversion to the

primitive. It is not necessarily the outcome of experience, since hounds of any age are liable to acquire it, and there can be little doubt that were the tendency not discouraged for obvious reasons, it would become as habitual in English foxhounds as among their wild representatives of the eastern jungles.

The tendency among wild creatures to combine for defence as well as for attack is perfectly comprehensible, being as a rule merely an example of the world-wide adage of safety in numbers. Gregarious animals naturally scatter in a moment of panic, but their primary aim is to reassemble as quickly as possible, while a hunted creature's main idea of safety lies in rejoining its flock or herd, or, in the case of those which normally lead solitary lives, in reaching some place where others of its kind may be found. Its intention is undoubtedly that of diverting pursuit from itself, and, once more, the proceeding proves indirectly beneficial to the species, since it usually saves the life of the animal concerned without necessarily sacrificing another. That sheep or cattle "bunch" when alarmed is common knowledge, but whether with an idea of presenting a united front to possible attack or from a desire upon the part of each individual to get behind its neighbour is open to conjecture. The outer animals certainly confront the danger—real or imaginary—but they can seldom adopt any other course since pressure from behind

usually precludes any idea of further retreat. The conventional picture of the buffalo herd facing the horde of wolves, with the bulls forming an armoured ring around the cows and calves, may have a foundation of truth. Since fighting bulls are in the minority, however; since the cows with young to guard would be the more ferocious under such circumstances; and since the wild pack almost invariably selects an isolated victim, the case may scarcely be cited as forming a characteristic example of collective defence.

Those who observe animal actions are confronted with no greater difficulty than that of distinguishing between direct and indirect effect. The apparent rescue of one animal by another might so easily be nothing more in reality than attack upon a common enemy. The story of the wounded bison pulled down by wolves, which in their turn were swept away by the destructive charge of the injured animal's companions, provides an apt example, since the wounded animal was itself trampled to death beneath the hoofs of its rescuers to whom, in truth, its fate was a matter of utter indifference. When a large bird such as a blackbird or a starling is seized by a cat, the outcry is likely to collect every bird within hearing. The cat is beset by a furious throng whose denunciations, if not actual attack, may cause it to relinquish its prey. The mauled victim, if still living, flutters away. Rescued,

indeed, it has been, but its woeful case attracts no further interest. The enraged army of birds merely follows the cat, pursuing the vituperative campaign until the object of resentment is no longer visible, when the tumult gradually subsides and the belligerents disperse. The wounded bird, perhaps dying in the bushes fifty yards away, has been completely forgotten in the general excitement, although constituting in the first place the cause of the commotion.

Outcry of any sort upon the part of a wild creature is the almost invariable signal for the assembly of its fellows. The scream of a trapped rabbit has the curious effect of summoning others to the scene, when a reverse course of action might reasonably have been expected. Countrymen, when stalking rabbits on summer evenings, not infrequently mimic this cry to bring those at a distance within gunshot range. That they rally to the call there can be no doubt, the only matter for question being the reason for the proceeding. One can scarcely attribute it to motives of rescue, although now and again inmates of a crowded warren, emboldened by numbers, appear to render assistance to a companion in the grip of a stoat. In such instances numerical strength doubtless lends a measure of courage. Generally speaking, it seems more probable that fear is the responsible agent. The timid little animals become panic-stricken at the dread significance of the cry which

exercises so bewildering an influence upon them that as often as not they run towards, rather than away, from the sound. It may also be a case of fascination, for the outcry is probably attributed to the activities of a stoat, the effect of whose presence is so demoralizing that it may even possess the power of attraction, at least at such times when rabbits are upon the move and more susceptible to any prevailing influence. This may provide the true explanation of the "rescue" instances already mentioned as having been observed in warrens. That a fox can induce both rabbits and wild fowl to approach him is certain, while a weasel exercises the same power over small birds. However that may be, it is clear that a cry of distress inspires a terrified curiosity in animals, and this can scarcely be regarded in the light of sympathy or a desire to aid, since among many birds and beasts the interest displayed frequently results in combined attack upon the injured animal.

For examples of actual sympathy or genuine concern for the plight of another one must turn to creatures whose mentality and general conduct more closely approach human standards. At least a measure of *esprit de corps* is not unusual among monkeys. Sir Percy Fitzpatrick gives a vivid description of the rescue of a baboon from a leopard, effected by the other members of the troop. There is also upon record more than one case in which parties engaged in the capture

of living baboons have been fiercely attacked by hordes of the enraged animals bent upon the forcible release of the prisoners that have been secured. Big game hunters frequently affirm that elephants assist the escape of a wounded comrade, the injured animal being supported upon either side by one of the troop. This is a point, however, upon which proof positive is difficult to obtain for obvious reasons, although in view of the elephant's high standard of intelligence, one is perhaps justified in allowing it the benefit of the doubt, despite the many practical objections that the idea suggests.

As a general rule, good offices are not appreciated by an animal whether wild or tame. A foxhound, when entangled in barbed wire or when caught in a trap, does little to encourage the efforts of anyone—even his huntsman—who endeavours to extricate him from his plight. Physical restraint is usually necessary for the successful administration of any surgical treatment that involves the slightest pain or discomfort, and one may rest assured that no wild animal submits to the assistance or service of another, unless such offices are pleasurable, or at least entirely innocuous. Few creatures, indeed, would be capable of the stoicism recorded in the following extract from an old work illustrating Eastern customs and mentality.

“The Banian hospital at Surat is a most remarkable institution for the accommodation of animals : in sickness

they are watched with the tenderest care, and find a peaceful asylum for the infirmities of age. . . . The most extraordinary ward was that appropriated to rats, mice, bugs, and other noxious vermin ; the overseers of the hospital frequently hire beggars from the streets for a stipulated sum, to pass a night among the fleas, lice and bugs, on the express condition of suffering them to enjoy their feast without molestation."

Such voluntary co-operation with the desires and needs of low-grade insects could be ceded by man alone, and when one animal appears to act in a corresponding manner as the benefactor of another, it may be taken for granted that the proceeding is not disinterested.

The case of animals such as the rhinoceros bird and the plover that picks fragments of meat from the teeth of the crocodile has already been mentioned in a previous chapter. Certain examples, however, such as cats and dogs who wash one another before a fire, or the monkey that extracts thorns and burrs from the fur of some four-footed acquaintance, cannot be cited under this head, since their companionship exists under circumstances entirely foreign to the natural state. These are none the less interesting in operation, however, since they illustrate this same tendency towards mutual service, the utility of which is not diminished by the probable absence of conscious intent.

The latter, it should be observed, is in no sense essential to *natural* co-operation, which as often as not is unwittingly effected by creatures

between whom fierce hostility exists. The hyenas which follow the lion to clear up the remnants of the royal feast certainly entertain no notion that they are helping to complete the lion's work and at the same time justifying their own existence by removing a source of offence to the air of the forest. The lion, upon his part, regards them not as his scavengers, but purely in the light of robbers, and, like every other expert hunter that is shadowed by so-called satellites, does his best to frustrate their intentions as long as possible. One may safely assume that there is as little goodwill between the lion and the hyenas or jackals who "tidy up" after him to-day and may perhaps pick his own bones to-morrow, as between the sportsman and the carrion crow or vulture that endeavours to forestall him, yet Nature for her own purpose has organized unconscious alliances between creatures whose mutual attitude is one of bitter animosity.

The co-operation between man and beast or bird differs from anything in the wild for the cogent reason that it is effected by intellectual superiority upon one side and has no parallel in Nature, since "mind" is merely subsidiary, and partnerships of the kind—if so they may be termed—are not essential to the wild scheme. Apart from all questions of mental ascendancy, however, one comes across cases of curious "natural influence" which enables certain indi-

viduals and certain races, respectively, to establish a close understanding or sympathy with various creatures. There are natural horsemen, snake-charmers and "dog-mushers". There are men whom bees never sting, although the reason for this is doubtful, and upon the banks of the Nile there exists a tribe that has achieved the seemingly impossible task of living in amity with crocodiles.

One might conclude with the somewhat homely "superstition" that a cat exercises a restraining influence upon the caprices of a vicious horse, and for this reason it is still customary in old-fashioned establishments to install a cat in a stable that contains an equine inmate of this description. This restraining effect—if indeed it exists—is capable of a simple explanation. It may well be that the feline scent inspires in the horse an instinctive fear or aversion, such as may also be found in certain human beings, that acts as a counter-irritant to its vicious impulses. The blacksmith's custom of twisting a cord round the upper lip of a kicker "to give it something else to think about" is well known, and the subduing effect is as remarkable as the contrivance is simple and inoffensive. But this problem seems scarcely within the scope of wild animal co-operation.

•

CHAPTER VIII

LANGUAGE

FROM the animal's ability to act in conjunction with its fellows, and the mental processes which render such conduct possible, there arises the inevitable question as to the means by which the interchange of ideas is effected, together with the part played by actual language, vocal or telepathic, in decisions reached or information conveyed. Before entering upon the difficult subject of vocal intercourse, it is essential to study the position of animals in this respect, as compared with that of mankind.

Among human beings speech represents the universal method of communication. So dependent upon it has man become, that for the benefit of those persons who lack the faculty it has been found necessary to devise codes which can be translated into words. Among animals the situation is diametrically the reverse, beasts and birds as a general rule having recourse to vocal utterance when, and only when, no other method of communication is available. The lost lamb that bleats for its mother, or the cow that bellows for her calf, ceases the outcry when re-united. Vocal utter-

ance is usually the expression of emotion for which there is no other outlet, a reserve faculty seldom employed unless under pressure of circumstances that renders its use imperative, and in many instances vociferation of any sort is merely inspired by example, as when dogs bark at the distant clamour of others without any knowledge of the original cause, or when sheep upon the move bleat in concert.

For the most part, however, animals are silent when in the company of others, their voices being uplifted more frequently for the need of companionship than as a means of availing themselves of its amenities. Among animals, indeed, the employment of the vocal organs serves rather as a substitute for conversation than as a means of pursuing it. It should be emphasized that in the avian community the habit of perennial song is confined mainly to solitary species, thus providing an emotional outlet for those tendencies or inclinations that induce other birds to seek companionship.

There have been various attempts to translate the language—if one may so describe it—of loquacious creatures into words. Such efforts, however, for obvious reasons, are seldom convincing. It is tolerably certain that the majority of calls uttered by birds and beasts lack conscious meaning. They merely express the animal's mood at the moment—joyous, bellicose, amorous, as the case may be—and as a general rule convey

little more to the limited intelligence of their fellows. A jealous male recognizes the challenge of a rival ; pairing birds the note of a possible mate ; gregarious creatures the rally-call of their race. Beyond these and a few similar instances, however, one may safely assert that actual speech among animals does not exist, so far, at any rate, as the expression may be held to apply to the deliberate exchange of ideas.

The most popular notions are usually those farthest removed from the bounds of possibility, a curious example of which is afforded by the fact that the favourite animal stories have for the most part been those in which furred and feathered characters talk and act after the manner and according to the standards of human beings. Truth, however, is frequently more interesting than the most fantastic fiction, and, faithful to this principle, the real language of "dumb" creatures is far more remarkable than an imaginary code of speech that cannot be brought within the bounds of the animal's psychology or the vocabulary at its disposal.

Animal language is not a matter of words and phrases. It is rather a mute language, consisting mainly of quick sympathy and intuition, and in the exercise of faculties about which mankind as yet knows very little. Actually, it is perhaps for the most part a case of reciprocal instincts so marvellously keen that the human mind, working upon an entirely different plane, is unable to

follow or even to comprehend them. There is, for example, no human equivalent to the means by which a wild hind induces her calf to remain motionless in its form, where it is comparatively safe, during her absence. It certainly cannot be a case of "instinct" in the generally accepted interpretation of the word, since the first natural impulse of the calf under ordinary circumstances would be to follow its mother. Nor, one may rest assured, is there any verbal method of communication as between Fortescue's charmingly portrayed cervine characters. No explicit instructions can be issued or received, yet neither the young calf in the oak-scrub nor the leveret in the grass will stir from its invisible bondage until the return of the parent releases the spell.

Consider, again, the movements of gregarious birds upon the wing, controlled, as they appear to be, by some central guiding force of whose existence there is no tangible evidence. A mighty avian company moves like one bird, not a single individual among hundreds or thousands appearing to entertain the slightest doubt as to the next move. It is easy to talk of "common impulse", or "force of example", but impulse alone in the case of thousands can scarcely be spontaneous unless directed by some irresistible guiding factor that is not apparent, nor is it conceivable that every bird could follow the mere example of those in advance with the unanimity and lightening-like celerity which

invariably characterize their evolutions. Surely the wonderful clock-work effect and absence of confusion can only be assured by at least a measure of foreknowledge or anticipation, although the existence of any such system admittedly enhances the difficulty of comprehension from a human standpoint.

Perhaps the most remarkable example of bird telepathy is provided by a great flock of starlings coming in to roost. The dusky column of birds describes a long curling sweep across the darkening sky, circles the roosting-place—once or half a dozen times as the case may be—then at the psychological moment descends like a falling cloak upon the gloomy tangle of tree-tops. The actual descent constitutes one of the most extraordinary aerial evolutions that can be witnessed. As often as not, the wheeling flock breaks in mid-career into a dizzy cascade of birds, plunging headlong into the dark ever-greens with a sound as of waves upon shingle.

One would like to know how the leading birds decide upon the precise moment at which to take that suicidal-looking plunge, and what directs their unanimous choice of the actual alighting place. The decision can scarcely be reached merely through the operation of the great guiding force for, if solely responsible, instinct in this case frequently appears to err. As often as not the birds have barely descended before again taking wing, rising with the same uniformity of

purpose that marked their precipitate downward movement to seek lodging—less crowded, perhaps—in some other part of the wood. Indeed, for the space of half an hour or so as dusk falls, the roosting-hollow will be swept by sudden waves of sound as one company after another changes quarters with a whirr and rush of countless wings in unanimous motion. It might indeed be argued that in such cases the initial instinct was in truth correct. That the selection was suitable to the common mind or requirements, but excessive numbers rendered the position untenable and so necessitated frequent change until all needs were satisfied. Admitting this possibility, however, the case remains unaltered, since the question automatically arises as to the manner in which the desirability for “general post” is transmitted. One may not be justified in the assumption that any signal is given—indeed it is tolerably certain that nothing of the kind takes place—but in the absence of direct instruction there is no apparent incentive to collective movement. It surely cannot be a case of example, for individual birds are continually shifting from one perch to another, and even from tree to tree, without arousing the communal impulse to take wing, while the clamour is so deafening that any possibility of the flock acting upon some prescribed note of command is out of the question, even assuming that birds recognize appointed leaders—a sup-

position that open-minded consideration from every point of view discards as highly improbable. Here again one could scarcely suppose that a common need for change would be felt by every bird concerned, since a certain number at least must have secured suitable resting-places. Indeed, the behaviour of starlings at their winter roosts suggests problems the solution of which, if available, would serve to elucidate many mysteries of avian psychology.

The points that arise in this connection are almost innumerable. How, by way of further example, does a flock of birds select the roosting-place for any particular night? It must be remembered that several alternative dormitories are probably available, and the movements of the birds in this respect, although common to many flocks, appear to be governed by no hard and fast rule. "Some nights there are hundreds of pigeons in these woods, and other nights there isn't one. I can't understand it," a gamekeeper once remarked when discussing this subject, and lifelong observation leaves one little the wiser. Theories as to atmospheric conditions, the direction of the wind, temperature, aspect under particular circumstances and the abundance or scarcity of food in the locality, seldom bear the test of experience. They may seem to apply for a while, but in the long run the lengthy and unaccountable tale of exceptions almost invariably exceeds the rule.

This, perhaps, may seem to be encroaching upon ground almost beyond the scope of bird language. Its connection, however, lies in the question as to the means by which a flock of woodpigeons, for example, assembled upon the stubble in late afternoon, selects the wood in which to pass the night. A dozen places, equally suitable so far as one can see, may be at their disposal. There may be little or no wind to determine their flight in any given direction, yet no uncertainty is perceptible in their course when at last they take wing roostwards. At first one might be inclined to suggest that the chosen destination represents the decision of a "master mind" who takes the initiative. This, however, would suggest some manner of conveying the ultimate decision to the rank and file. Common knowledge there must be, since it frequently happens that the original leader is displaced in the course of the flight without affecting either the direction or apparent purpose of the company. One cannot suppose that decisions are reached by actual verbal discussion. It is true that a flock of starlings assembled in a big tree before taking final flight chatters incessantly, but no reasonable person could ascribe either point or method to such a babel, while it must be remembered that woodpigeons or golden plover, equally capable of and addicted to unanimous movement, are perfectly silent under similar circumstances. It is also worthy of

remark that birds such as rooks, which actually appear to deliberate in council, more often than not act individually, each member taking flight according to his own fancy.

Far from exchanging ideas, it would rather seem that when gregarious birds give voice, they merely express some common emotion aroused by the impulse of the moment, the vociferation, like the impulse, being unanimous. Take the homely example provided by a flock of domesticated turkeys. Everyone is familiar with the call-note or "gobble", from which the male bird derives its popular name, and for this very reason perhaps, one may overlook a distinctly interesting circumstance in connection with its delivery. Turkeys are gregariously disposed, like their next of kin the game-birds, and when astray in the fields, their curiosity is easily aroused by any unusual object. They advance upon it in the same manner as that of cattle approaching a stranger, in perfect silence, until without the slightest warning, every long neck straightens suddenly, and with one accord each throat rolls forth its challenging note with disconcerting effect. So simultaneous is the common effort, that, near or far, one receives the impression of a single voice upraised, and no matter how closely the birds are watched, there is apparently nothing to indicate either the psychological moment or the reason for the sudden and startling outcry.

Contrary to human procedure, the important affairs of animal life are conducted without the aid of conversation. The bird, when building her nest, must settle the delicate problems arising from the questions of site and available materials without the advantage of discussing debatable points with her mate, which circumstance renders the wonderful co-operation displayed upon such occasions the more remarkable. Even in the conduct of their domestic affairs, however, the limitations of the birds' ability to communicate their desires to one another become pathetically apparent when some emergency arises that is foreign to everyday experience. One frequently witnesses instances of animal helplessness in tragedy that might so easily have been averted were the creatures only capable of imparting even a little valuable information to one another, or of making a single helpful suggestion. The story of Seton's sparrow ensnared in a horse-hair and unable to obtain assistance from its mate, who could devise no better plan of rescue than that of tugging at the captive's foot and so tightening the fateful noose, provides an apt example of characteristic behaviour in such a dilemma. The will to assist was there but was rendered unavailing by the inability of the sufferer to explain the precise nature of the predicament, or the manner of help that was required.

Consider, again, the common case of a fledgling

that topples from its tree-top home before its wings are sufficiently grown to serve any other purpose than to break the force of its fall. It can communicate some idea of its distress to its parents by the free exercise of its lungs, and they can so far respond as to supply its needs in the matter of food. They may even endeavour to lure it back to the upper branches by dint of example, but its continuous complaints seem powerless to make them realize its inability to comply, upon which account, perhaps, they make no attempt to assist its efforts. It cannot tell them that it is cold and wishes to return to the nest, nor is it within the limits of their intelligence to anticipate and actively abet such a desire, or even to guide the young bird to a spot where some of its requirements can at least be met. The departure of a fledgling from a nest is, under ordinary circumstances, a definite step, deliberately undertaken when the youngster's instincts and rapidly developing physical powers prompt such a course of action. Its return would constitute an unheard of proceeding, and the avian scheme of things has no place for the abnormal. The parents recognize the cry of the outcast as expressing a need which they interpret as nothing beyond a desire for food—the only conceivable desire. In consequence, the young bird either perishes from exposure or falls a victim to the first enemy that it encounters.

The simple statement of a want constitutes,

perhaps, the best definition of vocal intercourse most customary among animals. It defines the call of mate for mate, of young for parent, of the hungry for food, of the solitary for companionship. The call in such cases is mainly uttered with intent, and understood by the ears for which it is intended. Scarcely different is the summons of the mother for her brood, or that of the farmyard cock for his harem when he has unearthed some special dainty. Such utterances, once again, represent nothing more than the expression of an instinct, and to this category might be added the alarm note of the old flock-master who sights real or imaginary danger. The raucous warning croak uttered by an old rooster when the shadow of some big bird passes over his yard has already been described.

There can be no doubt that wild birds also employ alarm notes which are recognized and respected by the entire avian race. Upon the other hand, many cries frequently regarded as deliberate warnings in reality amount to nothing more than mere expressions of terror or excitement, uttered entirely without intent to convey information to others. The frantic screech of a jay at sight of an owl or a fox probably expresses no more than personal opinion of the freebooter. The fact that the sound attracts the attention of other birds is merely the indirect though inevitable consequence. Similar in character is the snort of a startled sheep, spreading alarm through

the entire flock but actually representing the involuntary ejaculation of one scared animal. It is analogous to the sudden jump or exclamation of a human being under corresponding circumstances, which has the certain but unintentional effect of startling his companion.

Gregarious beasts of the graminivorous orders have a simple and effective way of conveying warning against a common danger. They articulate no sound, but the stamp of a hoof or the crisp thud of a furry pad upon the turf instantly turns to stone every deer or rabbit within hearing. In the latter case both motive and effect are sufficiently clear, but there is no obvious reason for the curious wing-clap which is a trick frequently practised by both wood-pigeons and wild ducks when circling some spot upon which they desire to alight but regard with uncertainty, if not suspicion. The theory advanced by some naturalists that it is a request for guidance does not altogether meet the case. The wild duck should need no signal to pilot him to the feeding grounds, his own keen senses being more than sufficient for the purpose. Neither should the woodpigeon require further testimony than that of vision with the wide sunlit landscape spread below him. It is possible that the bird may entertain doubt as to whether friend or foe holds the fort, and the resounding wing-clap—almost invariably given from a safe distance—is intended to attract the attention of

the forces in possession and induce them to disclose themselves. Upon the other hand, it is equally possible that the sound has no special significance, representing nothing more or less than an aerial gambol, executed in sheer exuberance of spirits, like the raven's "loop" or the weird springtime gyrations of the snipe or "wanton lapwing". Such exhibitions, it must be remembered, are not necessarily confined to the actual mating season, though most noticeable during that period. Warm days in early winter may tempt young bloods of the feathered or furred races to display their powers, even as sunshine at any season of the year induces birds to sing.

From the subject of bird song arise some of the most interesting questions in animal language, although there is, perhaps, little ground for the fanciful theories that have gradually crept into being. Avian music is taken for granted as a rule, and seldom is the question raised as to the reason for bird song. The performance serves no apparent purpose and as a general rule it seems sufficiently apparent that the vocal efforts of bird or beast are inspired by much the same emotions as those which induce a boy to whistle, and the most elaborate refrain—which at best can boast few real variations—is as devoid of any conscious significance so far as the musician is concerned, as some popular air that has never been translated into intelligible words.

There is no sound more familiar than that of

an owl practising its weird nocturnal solo in almost any wood, and one cannot but wonder that a rapacious creature should elect to advertise its whereabouts in so pronounced a manner. A rustic would explain the riddle offhand by calling attention to the cries of other owls away in the dark distance, and remark that they were "hooting one agin another". That they answer, or call in competition with one another is obvious, and here again one is faced with the inevitable and unanswerable "why"? Of what benefit can it be to the birds to exchange monotonous *tu-whits* and *tu-whoos* across lonely valleys hour after hour? Possibly the cave-men expressed wonder at the same thing, and one doubts whether the owls have made any perceptible difference in their vocabulary or varied the character of their discourse since that early period.

The hoot of a tawny owl, like the crow of a cock-pheasant at sundown, is one of the surest signs of fair weather. Before rain, or even during unsettled periods, both birds are usually silent. One seldom hears them when the barometer is falling. This rather suggests that the conversational part of the proceeding is a mere side issue, the loquacious tendencies of humanity, at any rate, not being visibly affected by barometric pressure. Everything indicates that the hooting of an owl is merely a matter of organic impulse, due to physical causes which,

upon their part, are largely influenced by atmospheric conditions. In this instance, the starlight duologues so often heard may be accounted for by the fact that the cry of one bird prompts that of another. This also serves to explain the communal barking of foxes or the concerted baying of wolves. "The coyote", wrote Seton, "must vibrate to the night song of the plains, for it touches something in himself," and this is probably the secret of "community singing" among the majority of wild creatures.

It is a matter of spontaneous inspiration that passes with the conditions which engender it. This accounts for the altered tones of birds and beasts which vary so curiously with the changing seasons; the eloquence of individual species at certain times of the year, and the notable silence of others. The missel-thrush sings in the storm which effectually quenches the outpourings of many songsters, for the cogent reason that some factor in the uncongenial conditions awakens a corresponding chord in his own peculiarly wild nature, even as the cuckoo, effectually silenced by a frost-laden wind from Siberia in early May, recovers his voice with the first pronounced change of temperature.

Whether the song of birds is entirely deliberate, or even a conscious effort, is another debatable point. This question has frequently been suggested by the behaviour of the tame robin so often mentioned. This bird constantly ripples

into song when perched upon the mantelshelf or the arm of a chair, quite undeterred by the activities of human beings within a few feet of him, and, when noting his little spontaneous outbursts, so obviously produced in sheer and irresponsible joyousness of life, one is constrained to wonder whether he is even aware of their utterance, any more than a puppy is actually conscious of wagging his tail. Yet this same bird, it must be remembered, comes readily to call by name, having learned in a surprisingly short space of time that a certain note uttered in a voice of which he possessed no instinctive knowledge, is intended for no other ears than his own, in which respect he resembles the game-chicks which come running from the coverts—their natural habitat—at the sound of the keeper's whistle.

It is only to be expected that animals which live in the closest touch with human beings should display the most marked tendencies towards conversational effort. A cat will respond when addressed by name, while horses readily learn to interpret set words and phrases. The contention that such is merely a matter of association makes little difference to the essential fact. By what other means are the rudiments of human speech instilled? In the animal's case, however, it is a clear indication of intelligence—a departure from natural procedure—the interpretation of words or phrases being

entirely foreign to all its instincts. The more credit is therefore due to the creature for its unquestionable aptitude at distinguishing between one word and another, and from this it seems obvious that among highly intelligent beasts the inability to express themselves in actual words is a physical rather than a psychological deficiency, the desire to communicate being prompted by human contact. The eager barkings and whinings, with their numberless variations and inflections, by means of which a clever dog declares its needs to a sympathetic owner—although never to another animal—may indeed be described as the nearest approach to speech of which the animal's organs can ever be capable. At the same time it should be emphasized that a dog, when expressing some want, has recourse to its voice as a last resource only. It tries every other intelligent means of persuasion before resorting to barking in sheer desperation, which goes far to prove that vocal expression is an acquired rather than a natural habit of its race.

The manner of communication that dogs adopt among themselves differs signally from that employed in their dealings with human beings, and from this arises the extremely interesting case of the hound whose voice when at work is of such paramount importance. Although many sportsmen may be disposed to disagree with me upon this point, long observation has led me to

the conclusion that a hound, when "speaking" upon the recovery of a line, has no idea or intention of imparting information to his fellows. That his eager vociferations inevitably serve this purpose, once again, in no way alters the fact, being yet another instance of general benefit being derived from individual action. The tune-ful note merely proclaims personal triumph, and would ring no less jubilantly were the hound that utters it alone in his glory. To "quest" is a habit more or less general among members of the canine race, and is practised by dogs that are certainly entirely devoid of any communal tendency. It is certainly true that all sporting dogs appreciate company when hunting. Individuals of almost any species, content to remain quietly at home when alone, as often as not immediately set off for the woods when joined by one or more of their own kind. Upon these occasions it is curious to note the manner in which the mutual intention is conveyed by one dog to another. There is no barking—they rarely utter a sound. There is just a sniff or two, an interchange of eloquent glances, a few eager turns and capers, and away they rush, regardless of every effort to restrain them. The irresistible impulse to hunt is apparently stirred by common suggestion, and this is doubtless an assertion of the original pack instinct which is at the root of so much in dog nature. This, however, by no means disposes of the question.

Dogs living some little distance apart develop the habit of hunting together when opportunity occurs, and if their owners take the trouble to compare notes upon these occasions, they may be surprised to discover how frequently each dog appears to expect the other. This may provide yet another instance of animal telepathy, but if so, the "sympathy" appears to take a singularly realistic form. The somewhat curious case, provided some years ago, of a fox-terrier may serve to throw some light upon the riddle.

The dog went to a new home where it appeared to be perfectly happy. Periodically, however, he was seized with a desire to revisit his former haunts and companions, upon which occasions his behaviour was interesting. Once or twice, when lying contentedly by the fire, he was seen to spring up, prick his ears as though in response to a definite summons, then rush to the door. When released, he scurried away, and within a surprisingly short space of time appeared at his old kennel, a matter of perhaps five miles across country. It is not unusual for a dog to return to his former home even after a long lapse of time, but the curious point in this case was the sudden pricking of the ears about which there was no possibility of mistake. The dog was clearly conscious of a definite call that came to him across the intervening miles—by what agency none can say.

All considered, it seems more than probable

that common suggestion is largely responsible for unanimous, spontaneous action, although the supposition marks yet another step upon the road towards purely mechanical motive. Human beings between whom a strong sympathy exists frequently express simultaneous thoughts or desires, and it is not unreasonable to assume that gregarious animals, when in company, acquire a common or community mind which reacts automatically to the circumstances in which they are placed. In such a case impulse might conceivably be general, response as mechanical as the rising and falling of barometers when placed in similar situations. Necessity for action would thus become apparent at the same moment, as in the case of the sentry bees described in the preceding chapter, even as certain conditions would engender a common desire. There would be no need to communicate ideas or to issue instructions, since each case would demand a course of action obvious to all concerned. Creatures of one species would select the same day for adopting a certain attitude or line of conduct, because, by means too elusive for human comprehension, the prevailing conditions would convey a particular appeal. The suggestion by no means disposes of the immense problems that invest the subject of indirect animal communication or telepathy, but it may constitute a step in the right direction towards solution.

CHAPTER IX

ADAPTABILITY

AMONG wild creatures habit is usually the outcome of necessity rather than custom. In effect, it is largely dependent upon the influences from which it originates, and may be modified considerably by changing conditions. It is possible for animals to depart from a line of procedure that has been regarded as immutable when the circumstances in which they find themselves placed demand or invite special adjustment. Take, for example, the case of the wild pheasant. Being a warmth-loving species, the bird prefers as a rule to roost in the woods among firs or spruces for choice, or, failing these, among trees that are sheltered from the prevailing winds by the lie of the land or adjacent heavy cover. It is obviously desirable from the bird's point of view that the perch should be well above ground level to obviate all danger from prowling foxes, and so confirmed has this habit or instinct become that few people conversant with the species in its conventional setting would expect to find a pheasant anywhere but well aloft after nightfall. Comfort, however, is more essential than security, it would seem, and

in wind-swept localities where timber growth is scarce, or where woods stand exposed to the force of the gale, the pheasant not infrequently departs from established custom and selects its nightly quarters deep in some tangle of coarse grass or rushes, undisturbed, indeed, by the keen night wind, but exposed to attack by four-footed enemies.

In the latter connection a somewhat interesting point arises. It may be noticed that districts where pheasants appear to roost habitually upon the ground are usually those most thinly stocked with foxes. If foxes happen to be re-introduced, or become re-established by natural processes, the roosters fall easy victims, since, unlike partridges, they lack the instinct that enables the latter to make special provision against attack from the ground. And here follows the problem. Among intelligent beasts or birds habit is acquired more readily than is perhaps generally realized, and it might not be unreasonable to suggest that the absence of the fox over a considerable period of years may induce a race of pheasants, unaccustomed to his depredations, no longer to apprehend danger from that quarter. Such being the case, the necessity for an exalted but chilly roosting-place would be removed, and the birds would be free to follow their natural inclinations. The foregoing supposition admissible, the question assumes a more general character. Were night prowlers, velvet-footed

and keen-sensed, originally responsible for driving the jungle-fowl, the capercailzie and the ruffed grouse to seek safety among the branches in the gloom of descending night? All game birds, it must be remembered, are more at home upon the ground than in trees, although even the domesticated fowl still assiduously mounts its artificial perch, urged by one of the few primitive instincts that continue to influence the conduct of its degenerate life. If in the course of time four-footed rapacious creatures disappear from the face of the earth, will future generations of artificially preserved pheasants or wood-grouse go tranquilly to roost in warm corners among gorse-brakes or sedges, untroubled by the menace of green eyes peering in upon them with petrifying effect from the surrounding darkness?

Circumstances alter cases in animal as well as in human affairs, for which reason it is seldom advisable without full consideration to discredit any story concerning wild life, no matter how improbable it may appear at first glance. Take, for instance, the frequent rumours of the bird's nest containing eggs, the discovery of which is claimed from time to time during mid-winter. As a general rule these may be dismissed as idle tales, being the outcome of some error or practical joke. The latter factor is probably responsible for many of the freak instances and "occurrences" that sometimes puzzle even experienced naturalists. When, for instance, a blackbird is

found to be incubating the eggs of a song thrush, there is probably someone in the neighbourhood capable of throwing light upon the incident if he chose. The unaccountable cannot always be disposed of so lightly, however. Nature's laws, like those of any other highly organized system, are subject to occasional modification or even derangement, although there is certainly too prevalent a tendency nowadays to confuse obvious exception with rule. This has been perhaps the most frequent cause of error in Natural History study.

Returning to the typical case of the mid-winter nest, the phenomenon is usually accounted for by the supposition that the avian instinct has been diverted by abnormal atmospheric conditions. In certain cases this may indeed apply. Now and again in early winter, when birds have fully recovered from their autumnal moult, and the first sharp frosts have not as yet exercised their repressive influence, there is apparently a more or less general recrudescence of the mating instinct, this effect being demonstrated to a marked extent during the mild season of 1932. Then the garden robins were not only in full song, but unmistakably coquetting with one another, and in this respect they were by no means unique. In almost any garden sparrows could be seen flitting about with wisps of straw or feathers in their beaks, as though actually embarking upon nest-building activities. Even

the passing curlew could be heard uttering his spring trill, but most remarkable of all was the behaviour of two ravens, inhabitants of a neighbouring moorland combe. A local observer reported that he had seen one of these birds flying over the eyrie with building materials, but little significance was attached to the incident until a day or two later, when, passing along the valley, I was astonished to hear the loud challenging "bark" which is usually associated with the breeding season, both birds emerging from the great fir in which they annually nest and circling overhead with the excited outcry characteristic of the early spring months. Normally the eyrie lies at the unchallenged disposal of all visitors until February.

Needless to say, this recrudescence of the springtime emotions which is always liable to occur in a greater or lesser degree, is short-lived. The abnormal conditions that prompt the temporary assertion of the instinct lack the quality that is necessary for its maintenance. There is not sufficient vitality in the air materially to stimulate the production of either vegetable or animal life. With the rapidly shortening days the impulse fades like an echo, and the wild creature resumes the normal tenor of its way. In certain exceedingly rare cases, however, there may be birds in whom the mating instinct is so strongly developed that the counteracting influences of the actual season are offset, and an

abnormal brood is attempted. This would account for the freak clutches of eggs occasionally recorded at the least propitious times of the year ; but whether the young are ever reared or even hatched under such conditions is quite another question.

Beasts, upon the whole, would appear to be more responsive than birds to the effects of abnormal climatic conditions, or any other influences calculated to disturb the customary routine of habit. One is liable to come across a nestful of young rabbits during any month of the year, although the conventional breeding season extends roughly from February to August, the period varying somewhat according to locality, and this example is only one of many that might be cited. Even these instances, however, though more frequently encountered than the "early bird's nest", are rare, while it should be remarked that young animals, such as fox-cubs, when encountered out of season, usually appear to be isolated specimens. One seldom comes across an entire litter, unless newly born, from which it may be assumed that the majority pay the price that Nature claims for the contravention of her laws, which, after all, are the outcome of countless ages of experiment. Indeed, generally speaking, premature animal life stands little better chance of survival than that of vegetation in a similar case. It is tolerably certain that conditions unsuitable to the normal require-

ments will be encountered, and disaster is the inevitable consequence.

For the most part the same rule applies, no matter whether the young creatures arrive abnormally late or early. By way of illustration, one need only consider the case of game-chicks that have been produced as the result of a second venture upon the part of the parents. Upon the stubble during early September one not infrequently finds a brood of young partridges that are still too small even to fly. These "chirpers" are usually welcomed as being likely to provide sport when their older relatives have become too wild, yet for some reason the hopefully anticipated late covey rarely materializes. The young birds have an unaccountable way of disappearing, and usually a variety of more or less plausible explanations suggest themselves. It is possible that the young larvæ upon which chicks hatched within the prescribed period largely subsist are no longer obtainable. Again the ripe grain scattered over the stubbles in autumn may constitute fare that is too stimulating for tender digestions. It is clear, moreover, that late broods cannot find the same cover that the earlier chicks enjoyed. The shorn fields provide a nursery sadly different from the all-sheltering corn or mowing-grass, while predatory animals are more numerous in autumn than in midsummer, since a few extra weeks mark a more than appreciable difference in the growth

of young hawks, stoats, and more particularly, the rats which infest almost every harvest field. These and many other factors may contribute to the obvious result. No matter upon what theory one may endeavour to account for it, however, the significant fact remains. The birds were hatched out of season and the circumstances under which they strove for existence proved unsuitable in consequence. The importance of "habit" in Nature is therefore emphasized, together with the difficulties encountered by those creatures which endeavour to depart from it.

Whether animals which have definitely acquired either monogamous or polygamous habits ever violate instinct to the extent of reversing the order of procedure in this respect is a question which occasionally arises. When treating of wild life it is far from wise to make authoritative statements upon such a head, the liability of registering incorrect impressions being considerable. One may reasonably assume, however, that contravention of any strictly natural state of affairs is calculated to produce a corresponding reaction. Among game birds that habitually practise monogamy an unnatural preponderance of hens might easily result in two or three females falling to the share of one cock, and this appears to happen at times among the red grouse upon Dartmoor, where the distribution of birds is both sparse and uneven. The few that manage to exist naturally resort to the

best localities, and a bellicose old cock has little difficulty in keeping rivals at a distance. Good heather being scarce, the hens are not always disposed to follow their would-be mates into exile, and since no cock bird of inferior fighting capacity can enter the guarded area, the King of the Castle remains in every sense the possessor of more than he requires. In such a case he may prove the progenitor of two or even several broods, the inevitable question as to the effect upon the stock produced being irrelevant. From these and numerous similar instances it becomes sufficiently apparent that habit, no matter how deeply rooted, is adaptable to changing conditions. Indeed, it could scarcely be otherwise if wild life is to survive development, whether natural or artificial. Upon the other hand, habit, or the instinct of which it is the outcome, more often than not proves incapable of coping with emergency when action in direct contradiction to established custom becomes imperative.

Again, there is the case of conflicting instincts or habit which is often responsible for curious behaviour upon the part of animals, particularly of birds. Consider the familiar example of the over-stocked rookery. It is scarcely necessary to remark that rooks, above all branch builders, select nesting sites that are least accessible to climbers of every description. In course of time, however, certain favourite rookeries become so

populous that the demand for building space exceeds the available accommodation, and prospective householders are faced with the alternative of founding a new colony elsewhere or occupying sites in the surrounding trees which may be considerably below the approved height and accessible to attack from the earth in consequence—less suitable indeed in every respect. Either course involves a departure from custom, a violation of instinct. That the stronger impulse should prevail is inevitable, and force of habit, it would seem, proves more powerful than the sense of self-preservation, since, as a rule, the gregarious instinct outweighs every other consideration. In the great majority of instances, rather than abandon the historic rookery, young pairs that cannot procure impregnable sites build their nests in adjoining trees, although of lesser altitude, and so an extending rookery frequently includes a number of nests that may be reached with comparative facility. Now and again, indeed, one comes across instances of old rookeries that for some reason are abandoned, while new ones spring up in the vicinity. As a rule, however, new colonies are exceedingly rare, well-established breeding-places being preferred at any cost. Gulls act in a similar manner under corresponding circumstances. Generally speaking, few nests are less assailable than that of the herring-gull, yet most naturalists will know of some favourite cliff where the demand upon

available space is so great that many of the birds, if they elect to remain, are constrained to nest upon ledges scarcely above sea level. This course they apparently adopt rather than take advantage of the vastly superior accommodation that many stretches of the neighbouring coast-line would afford. Indeed, one might safely assert that only under stress of absolute necessity will gregarious birds depart from the community habit when once it is acquired.

Among human beings the expression "habit" is usually employed to denote some trick or mannerism that has been acquired by an individual. Among wild creatures upon the contrary, it rather stands for the course of action that the animal finds or knows through instinct to be the most expedient for its needs, or the gratifying of its desires or inclinations. When a natural disposition, such as building in high trees, cannot be gratified the bird automatically adapts itself to circumstances. It does not necessarily abandon a locality that fails to provide even those amenities which it seems to consider essential when procurable. Both the raven and the carrion crow find a veritable happy hunting ground upon the wilds of Dartmoor, and there both species remain to breed, although neither can find the conditions for nest building that it deems indispensable elsewhere. More often than not the crow is compelled to make use of a mere bush within a few feet of ground

level, while the raven, for lack of the mighty precipice which constitutes the home of its choice, selects a ledge upon some comparatively insignificant rock and hopes for the best. Each bird might satisfy its requirements more adequately by going farther afield, but ulterior considerations are sufficiently strong to compel departure from a course of action that has become second nature.

All considered, general habit or rule is apt to prove a most untrustworthy guide for the sportsman or naturalist when he endeavours to anticipate animal behaviour. Necessity, example, opportunity, and even weather may, each in its way, influence actions that might otherwise have been purely automatic. Impelled by hunger, a badger, too early astir in a backward season, might snap up a lamb or break into a hen-roost, though normally preferring his natural diet of young rabbits, grubs and roots. Example or the courage inspired by numbers, might embolden a chaffinch to swoop at a falcon, even as one crafty old rabbit in a large burrow can spoil a day's sport by dodging and refusing to "bolt", thus inciting its fellows to adopt similar tactics. Wild creatures, whether winged or furred, are peculiarly apt to follow the cue supplied by one of their number, and this circumstance assists, though by no means serves to account for that unanimity of action which has been the subject of previous discussion.

The direct influence of climatic conditions upon wild life generally is sufficiently obvious. The abundance or scarcity of certain birds is more or less regulated by their favourite food supply, and when this fails, as the result of natural influences or otherwise, those species which do not migrate to lands where their special requirements can be gratified must of necessity change their manner of life. During certain seasons almost every gardener has been troubled by a marked predilection for certain cultivated fruits upon the part of song-thrushes—birds which more often than not display little liking for currants and raspberries, and further, render sterling service by their effective manner of dealing with slugs and snails. It will usually be noticed that the thrush's fall from grace occurs during dry summers, or when molluscs, for some reason, are comparatively scarce, and in all probability, the bird, more than anyone concerned, regrets the circumstances which necessitate this vegetarian diet. It should be remarked, perhaps, that the thrush turns its attention to yew berries during early autumn, which is usually one of the driest and therefore most insectless periods of the year. Opportunity is, perhaps, the most significant factor of all, since it may easily affect the entire trend of a wild animal's life. It is often responsible for leading predatory creatures into bad habits, which under normal circumstances they might

never have developed. The mountain fox, which as a general rule keeps aloof from human habitations, may have the ill fortune—for so it proves in the end—to blunder upon a stray duck or chicken when pursuing his first peregrinations as an inexperienced cub. That he will henceforth adopt this easy means of procuring a livelihood is extremely probable, and that fox will certainly prove a poultry thief until the end of his days, which, as a direct consequence, will not be many. The same principle applies to the large beasts of prey, and even to the big herbivores which in some countries prove such persistent destroyers of cultivated crops. In the majority of cases, the wild creature is under no necessity to prey upon either the agricultural or domesticated product, but when opportunity places such commodities in its way, unless speedily deterred, it soon regards them as a habitual source of livelihood.

Sufficient allowance is not always made for the very considerable effect of pure accident which alone is responsible for many curious incidents that are recorded. Some little time ago in one of the leading newspapers there appeared a description of a chaffinch's nest into the outer structure of which a large amount of confetti had been embodied. The nest had been built in a hawthorn near a churchyard gate, and the blossoming of the bush coinciding with the incubation of the eggs, the case was represented

as a remarkable example of deliberate camouflage and foresight upon the part of the builder. Of the actual camouflage there was, apparently, no question. Upon the other hand, it seems scarcely reasonable to assume foreknowledge, intent, or even consciousness of the ultimate effect, so far as the bird was concerned. The bush would not have been in bloom while the construction of the nest was in progress, nor is it probable that the bird would either realize the similarity in colour between the particles of paper littered about and the as yet invisible blossom, or even anticipate the flowering of the shrub at all. One would rather suggest that the paper was used solely because it happened to constitute the nearest available material, in the same manner as lichen is so effectively employed for the concealment of the nest in an old apple-tree. With regard to the confetti, it is tolerably certain that during the building and egg-laying period the foreign substance was better calculated to render the structure conspicuous than to serve any purpose of disguise. Actually, the proceeding was foolish rather than provident, although the trend of circumstances over which the bird had no control proved fortunate.

For the most part, wild creatures are less suspicious of the artificial than might be supposed. All considered, the readiness with which blue tits accept the accommodation offered by nesting-boxes is remarkable, while one might reasonably

have expected the wary rook to look askance at a newly ploughed field, since definite change is apt to be regarded with disfavour. In this respect, one witnesses some curious examples of the inconsistency of the animal mind. Rabbits will forsake a hedge that has been re-dug, or even cleared of brambles, yet they display no fear of wire-netting that has been erected to exclude them. They will immediately test its capacity for resistance, quite undeterred by its many dangerous possibilities. Upon the other hand, the overnight cutting of a single swath around a corn-field in preparation for a self-binder on the morrow, is accepted as notice to quit by the entire rabbit population. How the connection is traced between the preliminary pathway cut at sundown and the subsequent levelling of the crop is a question more easily asked than answered. In nature study there is no distinction more difficult to trace than that between the operation of subtle influence and pure coincidence. A neighbouring landowner whose estate abounds with rabbits but lacks sufficient cover for good rough shooting, recently made an interesting experiment. Collecting a quantity of hedge-clippings, he deposited them in patches upon some rough fields overgrown with coarse grass and bracken. Ground game being addicted to frequenting waste piles of brush when these have not been placed for the purpose, the man in question naturally expected

that many rabbits would avail themselves of so liberal a catering for their propensities. He left the little artificial brakes undisturbed for several months, until the rank vegetation, growing up amongst the dead wood, provided excellent "lying". When the day arrived for trying the ground, however, scarcely a rabbit was to be found in the dry brush, though numbers were sitting out amongst the adjacent herbage.

To attribute so signal a failure to the vagaries of chance seemed scarcely reasonable, while the possibility that artifice had been suspected may also be discounted. The naturalizing effects of time had long since disguised any alteration in the original character of the fields, the cover, indeed, being of older date than many of the rabbits themselves. It seems more probable that force of habit once again constituted the governing influence. Generation after generation of rabbits having been accustomed to shelter in the deep grass, the existing members of the race had experienced no desire to seek fresh cover. Eventually a new habit might develop, but for the time being immemorial rule still prevailed. Instinct, too, may have played its part, since the brushwood had naturally been placed in the most open parts to facilitate shooting. Against this it must be remembered that a rabbit or hare constantly makes its form under any little tussock or bush surrounded by bare turf, irrespective of the advantage thus

ceded to the man with the gun. None the less it is apparent that every hunted animal in the course of time evolves tactics calculated to counteract the special form of attack to which it is subjected, and birds or beasts of sport certainly recognize the advisability of keeping out of sight. Thus long grass through which a small animal can move unseen offers the most suitable cover for ground game, even as "broken" country enables the woodcock to disguise its line of flight. The animal may or may not be conscious of this advantage, but it is not unusual to see a rabbit "belly" its way through young corn in a manner that strongly suggests a deliberate attempt to evade notice. Usually, it would almost seem that animals are most prone to resent that form of interference with their economy which closely approaches the *natural*, although for every reason the reverse might be expected. Rabbits have cultivated no instinctive fear of the terrible gin, the employment of which appears to create no panic, even though the screams of their captive fellows render the night hideous. At least, they evince no tendency to forsake the region of the trapper's activities. Upon the other hand they soon become shy of ground that is disturbed by dogs or even cattle. A single stoat or an escaped ferret will depopulate a warren more speedily than a steel trap in every runway.

It is more or less definitely recognized that

rabbits produce young earlier upon farms where wholesale trapping is the rule than upon other lands where shooting and ferreting are the methods adopted. This, at first glance, might appear incredible, but the circumstance is capable of simple explanation. Trapping is usually executed upon an extensive scale, only comparatively short periods being occupied with the proceeding. The surviving animals are not otherwise molested and they pursue their affairs undisturbed. Guns and ferrets, upon the contrary, though infinitely preferable from every point of view, involve frequent disturbance. The rabbits are kept continually upon the move. Pairs—they are usually found in couples during January—are either killed or separated, while a particularly heavy toll is taken of those lying underground in the small burrows which they would shortly have used for breeding quarters. Strictly speaking, therefore, the case, though curious, is scarcely a matter of “habit”. It is plain cause and effect, or, in other words, a natural tendency retarded by artificial influences. Needless to remark, no animal readily surrenders or violates its natural inclinations, while an instinctive preference, even if dormant for generations, would probably assert itself at the first opportunity. It is equally certain that wild animals as a rule *prefer* the natural to the artificial. No matter how liberally a gamekeeper may feed his pheasants, their tendency to stray proves a

constant source of trouble. They have certain requirements which all his care cannot entirely satisfy. Again, no matter how readily the wild-born creature may adapt itself to life in the captive state, it seldom fails to seize the first opportunity of regaining its liberty. The difficulty experienced in inducing many animals to breed in captivity affords sufficient proof upon this point. It has already been noted that the majority of wild birds that visit a garden "table" during hard weather decline the proffered fare as soon as their normal source of supplies is once more available.

The precise extent to which the normal behaviour of animals, and more particularly that of birds, is affected by such influences as weather cycles, or a retarded spring, must remain a debatable point, since there are always fundamental laws to be reckoned with, and these must remain for the most part unaltered. One often hears the question raised as to the effect of atmospheric conditions upon the nesting and laying habits of various species. The consequences of a backward season, as reflected in the production of the little feathered families, constitutes an interesting problem, and as usual in such cases, opinions expressed upon the subject vary considerably. There are naturalists who believe that the actions of birds and beasts are in no way influenced by the calendar, and that actual conditions, such as temperature and other un-

mistakable indications of the season's progress, represent the sole influences by which their impulses are governed. Other people, again, who specialize in the statistical side of Nature study, base their calculations upon dates rather than climatic conditions, claiming the ability to indicate almost the day upon which migrants will arrive or the eggs of some particular species be laid.

One is tolerably safe in asserting that there is no hard and fast rule in such matters, a great deal depending upon the individual birds. Observers who have the opportunity of watching some particular pair year after year, more often than not record a remarkable regularity in the date upon which the nest contains the first egg. This, curiously enough, applies more especially to the earlier breeding species, the birds which upon that very account might be expected to suffer most or to be retarded by severe weather. As a general rule it will be found that the March-breeding birds are more punctual to date than those which defer nesting operations until late April or May. Curious as this may seem, however, it is, in truth, only natural, since the early birds are of necessity the more hardy varieties, upon which the inclemencies of a cold or backward season have little effect. Indeed, for some unaccountable reason, it sometimes happens that the early nesting birds are before rather than behind their customary time when the spring

proves abnormally backward. Such, incidentally, appeared to be the case during the eminently retarded seasons of 1931 and 1932. At least two pairs of ravens upon Dartmoor were in advance of the calendar, the young in one instance being strong upon the wing in the second week of April. Magpies, thrushes, blackbirds, ring-ouzels and robins were all ahead of their customary dates, in spite of weather uncongenial enough, one would have thought, to discourage any idea of a proceeding so eminently spring-like as nest-building. By way of comparison, it might be interesting to add that a raven's nest, observed from 1927 to 1933, contained the first egg upon dates varying from February 27th to March 2nd. Over the same period, a pair of flycatchers made its first appearance in its nesting locality upon dates as widely separated as May 7th in 1933 (a forward season) and May 22nd in 1932, which was one of the most backward years in this respect within personal experience.

The later birds for the most part consist of the warmth-loving species, composed to a large extent of migrants, and these as a natural consequence are not so liable to encounter sudden or extreme changes of temperature, for even our versatile English spring seldom produces iron frost in May. The effect of a cold snap in the middle of the laying season is apt to be somewhat disturbing. Every poultry-keeper knows

its influence upon the egg-producing capacities of domestic hens, and one can only assume that wild birds are affected—at least to some degree—in a similar manner. In early May 1932, a chaffinch's nest was found containing one egg, obviously the first of the clutch. When the nest was inspected for the second time a week later, no more eggs had been laid, and it appeared to be yet one more case of tragedy or desertion. It was the more surprising, therefore, when after the lapse of another week a more or less accidental examination revealed the arrival of an additional three eggs, after which the clutch, now apparently complete, was successfully incubated. A renewal of cold conditions setting in after the depositing of the first egg had obviously constrained the bird to suspend operations for a while, and it is more than probable that similar instances are of constant occurrence.

As a rule, a cold season is more liable to restrict the number in a clutch than to delay the process of laying. Such at any rate is the apparent effect. Possibly, the laying once arrested, the bird embarks upon the task of incubation as a matter of course, whether the clutch is complete according to the normal standard or otherwise. After incubation has once begun it is unusual for more eggs to be laid, although this occasionally happens, as with a sparrowhawk's clutch observed some years ago. The bird had been sitting for ten days upon

four remarkably handsome eggs, when a fifth arrived in the nest, of a much paler colour than its predecessors. This latter peculiarity was obviously due to exhaustion upon the part of the bird, but the cause of its appearance at all presents a somewhat interesting problem.

A second clutch is seldom so large, a carrion crow, for example, when constrained to try again, rarely producing more than three eggs as compared with the five or six that usually represent the initial effort. A crow in late May has been found incubating no more than two, and in one instance, personally witnessed, a single egg only. The latter, by the way, is an exceedingly rare occurrence, since few birds will sit upon a solitary egg, even during the later stages of incubation. Earlier, if eggs are removed singly, leaving only one in the nest, certain species whose arithmetic—or memory—leaves something to be desired, have been known to produce a surprising number, pathetically striving to augment the clutch which never visibly increases. A magpie was once inveigled into depositing as many as thirteen by the simple process of removing the third egg each day as it appeared. The latter, however, can only be regarded as a freak case, being scarcely consistent with the policy that a bird would normally adopt under such extreme circumstances.

Briefly, it may be taken for granted that departure from long-established habit, unless

enforced by natural influences to which the animal instinct is prompt to react, is usually accidental rather than premeditated. The average bird or beast is intellectually incapable of embarking upon a line of conduct that involves direct initiative foreign to its natural impulses. Among wild creatures, even as among men, necessity is the frequent originator of achievement, but the need must be great if strong enough to break the leading-strings of immemorial custom. Among animals, undoubtedly, there is also the abnormal element, composed of creatures deficient in instinct or intellect. These may infringe rule, even as their representatives in human life fail to recognize either law or convention. Their category, however, is too limited to warrant serious attention.

CHAPTER X

REACTION TO EMERGENCY

ANIMAL reaction to emergency is quite distinct from the adjustment or formation of habit, and when observing the actions of beasts and birds, one is frequently puzzled at the manner in which wild creatures behave when faced by sudden exigency or by some development, natural or otherwise, that directly concerns their way of livelihood or safety. Their conduct in this respect is necessarily subject to considerable variation, a great deal depending upon the standard of intelligence attained by the creatures concerned. As a general rule, the movements of beasts are mainly regulated by the supply of food or water upon which the scarcity or abundance of certain species to a large extent depends. Rats and mice, for example, forsake the fields in late autumn, not so much with a view to escaping the approaching winter, against the inclemencies of which they can usually find ample protection, but rather upon account of the removal of the grain crops, which they follow to the rick-yards or granaries. For a similar reason the snipe and the woodcock forsake the frozen marshes ; the

golden plover resorts to cultivated lands ; while the mountain vixen in a dry summer surrenders the safety of her rock fortress in favour of some shallow burrow beside a stream, where her young cubs may obtain an unlimited supply of the fresh water that is so essential to their well-being.

Here, however, one should perhaps remark that certain animals appear to lack the intellectual capacity for adapting themselves to temporary change of conditions, and of these the mole provides a characteristic example. A creature of singularly regular habits, its periods of alternative activity and inaction being almost mechanical, the mole possesses neither the instinct nor the intelligence with which to encounter an abnormal contingency. It has cultivated habits which supply all its needs in the ordinary course of events, and is well able to survive the vicissitudes of any normal year. Such provision, however, only serves its purpose for a prescribed length of time. Departure from rule proves fatal to the mole's economy. During periods of prolonged drought, for example, moles perish in considerable numbers, since they lack the instinct to seek their requirements in better watered localities, and while individuals of the race at times evince singular aptitude at evading the trap, the species as a whole may easily be exterminated within a prescribed area when measures to effect this purpose are undertaken upon sys-

tematic lines. Moles may be destroyed in large numbers, but they cannot be *expelled* from any given locality by organized persecution, for the obvious reason that the species is not subject to communal panic. So methodical are these little animals, moreover, in all their movements, that they cannot be prevailed upon to undertake any sudden departure from customary routine, unless the step is rendered imperative by some natural change of conditions such as the ordinary fluctuations of the seasons, which instinct has led them to anticipate.

Very different in corresponding circumstances are the actions of the conventionally foolish rabbit which in reality is one of our most interesting wild creatures, although usually overlooked as a subject for study on account of its very abundance and the consequent facility with which its many curious ways might be observed. Up to a certain point, there is no animal more tenacious than the rabbit. When particularly numerous, or when attached for any reason to a prescribed area, it can only be dislodged with the utmost difficulty. In the former instance it appears to consider that safety lies in numbers—a policy that holds good at least as far as the majority are concerned. In the latter instance, when abundance or superior quality of food constitutes the attraction, every other consideration relapses into insignificance. Rabbits, indeed, cannot be expelled from favourite feed-

ing-grounds. They will undertake nocturnal journeys of an almost incredible length in order to feast upon some particularly choice crop, even though the adventure involves nightly disaster to many of their number. At the same time, cover in which they can rest undisturbed is equally essential to their requirements, and they seldom *lie* upon ground that does not offer this additional inducement. Cover that is repeatedly tried by dogs seldom contains many rabbits, even though the number actually killed may be negligible, standing corn into which dogs have been allowed to run providing no exception to this rule, though tolerably certain to hold numerous rabbits when undisturbed. The same principle applies to burrows that are ferreted without sufficiently long intervals elapsing between each visitation. It frequently happens, therefore, that crops are destroyed by rabbits which, after feasting, retreat perhaps a mile or more to some stronghold in which they can rest unharried, at least for the time being. Curious as it may seem, beasts as a rule are more easily dislodged from their customary haunts by persecution than are birds in similar circumstances, although in the latter case a change of quarters can be effected with so much greater ease. Game-birds or wild fowl acquire additional wariness when frequently harried, but they rarely forsake a locality in which they have established themselves upon this account. Ground game, upon

the contrary, evince the utmost reluctance to settle upon land which has been thoroughly disturbed. Deer provide a notable exception to this rule. It applies forcibly, however, to the majority of small animals, the most interesting example, perhaps, being that afforded by rats and mice.

The rat problem is one that frequently confronts the agriculturist or the occupier of extensive premises upon which old buildings stand, and at times the nuisance becomes so pronounced that no matter how intensely one dislikes the principle, poison of some sort offers the only solution. When this course is adopted for the first time after a considerable lapse of years the result may almost be regarded as a foregone conclusion. That the virus is laid with reasonable liberality goes without saying and it is accepted with due appreciation by the rats, who regard it in the light of a windfall—an unusually generous recognition of their needs. Every particle of the lethal fare is demolished with avidity, and within the space of twenty-four hours or less not a rat, young or old, remains upon the premises. They have decamped, bag and baggage, and one can only conjecture upon the operation of the influences that prompted so sudden and complete a stampede. The case of the rodents which actually ate the poison is, of course, simple enough. Finding themselves in the grip of some strange and terrifying thing,

their first and natural impulse is to escape from it, which is doubtless the reason why rats killed by modern forms of virus are usually found at a considerable distance from their customary haunts. It must be remembered, however, that those actually affected in all probability constitute at most an inconsiderable minority of the population. When the vermin are numerous it is unreasonable to suppose that the poison is equally distributed among them. It is tolerably certain that the deadly morsels are consumed by a mere few—those rats which first happen to find them—and the question as to the cause of the general alarm that subsequently ensues is rendered the more interesting in consequence.

That the rodents realize that some new and highly dangerous influence is at work in their midst cannot be doubted. It is also clear that they flee from it like human beings from cholera. There is, however, no indication to suggest the mental processes through which the conclusions that dictate such unanimous action are reached. It seems more than curious that the sudden and violent indisposition of perhaps half a dozen animals should as much as attract the notice of, much less seriously alarm the entire community. An epidemic of any *natural* disease would almost certainly leave the unaffected members quite undisturbed in their minds. In any case, it is difficult to imagine the means by which the rats trace any connection between the illness of their

fellows and those harmless-looking fragments of food which were littered about and devoured as a matter of course, without the greater number of the animals as much as seeing them or being aware of their introduction. Even were the direct connection established in their minds, the circumstance scarcely accounts for the general terror and stampede. There is no apparent reason for the assumption that suspicion would extend in consequence to *all* food upon the premises, particularly since rats are capable of delicate discrimination in this respect as in many others. Of this ability a somewhat striking example was recently provided by personal experience of one of these creatures.

A particularly troublesome plague of rats about the buildings necessitated the judicious depositing of poison with the customary result. The nuisance appeared to have been completely removed, until it was discovered by chance that one old rat had either returned almost immediately, or had resisted the general impulse to run. For the benefit of this solitary individual—fool or sage, whichever he might be—more poison was laid with care. The old rat, however, was not to be lured, proving fully alive to the situation. The tablets were obviously inspected, even pushed about, but no matter how attractive they had proved to others of the race, this wily campaigner would have none of them. For the sake of experiment a few tablets were placed in an

earthenware saucer together with some fragments of bread, on the chance that the latter might disarm suspicion. The rat, however, proved more than equal to the occasion. It carefully extracted every crumb of bread, leaving the poison in a neat pile upon one side of the saucer. This sagacious and resolute rodent long held the fort, being either a "rogue" and therefore unaffected by the movements of its fellows, or the mother of a young family who had courageously refrained from abandoning her charge.

One naturally expects to discover a more highly developed intelligence among domesticated animals—those, in fact, most closely associated with mankind—and up to a certain point this supposition undoubtedly holds good. Upon the same principle, however, intelligence of the most remarkable order—when judged from the human standpoint—is not infrequently displayed by creatures which live in constant warfare with the human race, their very existence depending upon their ability to outwit the activities of man and his many contrivances for the destruction of animal life.

In view of this consideration, therefore, it is not altogether surprising that the "hooligan rat", though low placed in the animal social scale, if one may use the expression, for sheer ingenuity and acumen should yield place to none. There is no beast possessed of a finer sense of discrimination, and another old repro-

bate, grey in villainy, whose ability to detect any contrivance even indirectly designed for his undoing, deserves description.

He executed his raids with the most astonishing boldness, mounting fearlessly upon the kitchen table, removing scraps from plate, dish or tray, if these were left unguarded for any length of time, yet declining to have any dealings with the most tempting bait when attached to a flat "break-back" trap and placed upon the same table. How, one wonders, does the rodent mind differentiate between a tray or bread trencher and a flat wooden trap? How does it recognize the harmlessness of one, the lethal character of the other?

The same rat, moreover, seemed able to distinguish between food placed in his way with intent and similar fare of which he was not intended to partake. He would, for example, snatch a slice of bread that had been left for a few moments upon the table, but disdained the same commodity when displayed invitingly upon a small boxful of earth in a position where he could not fail to notice it. Usually, the most wily rat may be caught by this means, though it is advisable to allow him a free meal or two before attempting to catch him in a trap placed underneath, thus allaying his suspicions in advance.

Now and again, even after due "education", one comes across a rat sufficiently cunning to

detect the hidden contrivance, so wary a rodent usually managing to remove a large portion of the bait without impunity. The particular specimen already described took no such risks, however. Even though the box contained no trap nothing would induce him to set foot upon it. He was fully aware of its dangerous possibilities, although no danger actually existed, and once again one is at a loss to conjecture the mental processes through which the brain of a rat is capable of anticipating or at least suspecting strategy. It should be remarked that this particular animal was not averse to boarding a coal-scuttle full of ashes and delving amongst the debris for any edible fragments, yet one might naturally have supposed that from the rodent's point of view a coal-scuttle would suggest greater danger than a boxful of earth—an entirely natural substance.

Extreme wariness is not unusual in a very old rodent, although this individual certainly possessed it in an exaggerated degree. Moreover, he knew the difference between a trap set or unset. Upon one occasion a break-back (a humane trap), carefully arranged for his special immolation, was sprung by a mouse who received the full benefit of the blow. The trap, as it happened, was not immediately reset, and when sought for that purpose after a brief interval was nowhere to be found. It was subsequently discovered jammed in the entrance of the nearest

rat-hole. The dead mouse had attracted the attention of its larger cannibal relative, who, being unable to detach it in a hurry, had attempted to drag away the whole contrivance, the sprung trap having obviously lost both its significance and its terror. When reset with the mouse for bait, however, he evinced no further interest.

A rat, it should be emphasized, is not trap-shy by nature. Young ones are easily caught by the most simple devices, and even adults, until they have learned wisdom from witnessing the fate of others. A neighbouring farmer asserts that he seldom troubles to cover his traps, his theory presumably being that if a rat knows nothing about such things it will run over the contrivance without suspecting danger. If "in the know", it will not be caught, no matter how much care is exercised. However that may be, a rat's cunning is clearly the outcome of intellect rather than instinct, and one can only regret that as a rule its ingenuity is displayed in so undesirable a manner.

Returning to the original question as to the cause of a rat stampede when poison is laid, one wonders how large a part some consciousness of the abnormal plays in spreading the panic. It is possible that peculiar behaviour upon the part of affected animals may arouse more terror among the rest than any consideration of possible danger, or realization of cause and effect. In support of this supposition, one

might add that, according to report, a similar purpose was served by the old and distinctly cruel trick of tarring a living rat and releasing it to spread panic among its fellows. Deer have been seen to flee in the utmost alarm from a single stag to whose antlers some conspicuous alien substance has become attached, which circumstance seems to constitute a parallel case. Or do all such instances merely provide further examples of the "infection of panic", to which all living things, not excepting human beings, are liable? It is at least possible, again, that the terror displayed by the affected creatures when scurrying away from the mysterious enemy within them, communicates itself to others all the more readily on account of its precise character and cause being entirely unknown. It must be remembered that a vigorous trapping campaign, conducted against either rats or mice, is not infrequently attended by a similar result. In this case, however, there is little cause for wonder, since even if humane traps are employed, evidence of tragedy and disaster is sufficiently apparent.

From the subject of rats and mice another somewhat curious point arises. It may usually be noted that the movements of the latter species are regulated to a large extent by those of the former. As a general rule, when rats come, mice go, the reason for such behaviour being reached without unduly taxing the imagination.

By way of a direct example, in the case of the rat stampede just described, the house which had been entirely free from mice during the period of the rat occupation, was re-invaded by the minor pest in considerable numbers upon the night immediately succeeding the rat evacuation. It was a clear case of general post, and one is left in utter bewilderment at the obvious completeness and accuracy of the information that induced such behaviour. That in course of time the mice should discover that their dangerous cannibalistic relatives had withdrawn is only to be expected. Immediate cognizance of the fact and realization that the circumstance involves admission to a desirable foraging field hitherto closed to them is less comprehensible. Nor is it easy to account for the alacrity with which the mice avail themselves of the opportunity thus presented to them. One wonders how the little creatures, dispersed throughout the locality, become advised of the event. And scarcely less puzzling are the questions as to how they realize that the departure of the rats constitutes for the time being a definite step, and why, if in such close touch with the rats and their movements, they fail to be infected with the same panic, since animals of all species usually flee from a common danger or any suggestion that such exists.

When the case is reversed, rats appearing in force in buildings occupied by mice, the prompt

effacement of the smaller animals is both comprehensible and inevitable, the circumstance, moreover, providing sufficient proof as to the relations that actually exist between the species. One would not venture to assert or even to suggest that rats and mice are never found in abundance upon the same farm or homestead. Such is far from being the truth. Upon the contrary, there are many blocks of buildings—usually very old—which are infested by both species. Such instances, however, are equivalent to those in which animals as uncongenially assorted as foxes and rabbits or sparrow-hawks and wood-pigeons appear to occupy the same quarters. Actually, however, it is a matter of habitations within habitations, the weaker animal occupying places that for some reason are not accessible to the stronger, which latter is always given a respectful berth. In the rat and mouse instance, even the most superficial study would probably establish the distinct existence of rat and mouse quarters, certain parts of the buildings being more or less monopolized by one animal or the other. Upon premises where space is limited it is the almost invariable rule for each of the two species to predominate periodically.

The "local migration" of small creatures in considerable numbers, like so much in connection with animal procedure, is taken for granted. The actual performance is left to the imagination. There appears to be very little evidence

in support of the not unnatural supposition that rodents, like birds, assemble before embarking upon a journey, finally "taking off" in company. Certainly few observers are fortunate enough to meet a caravan of mice or rabbits trekking across the desert of an English countryside. Rats, indeed, are more gregarious in this respect, being occasionally encountered upon the move in considerable numbers. A motorist recently had the somewhat unusual experience of perceiving the road ahead of him starred with pin-points of red light reflecting the glare of his own lamps in the darkness. Slackening pace, he was astonished to find that the lights proceeded from the eyes of numerous rats with which the road seemed to be alive. As a rule, however, it seems scarcely probable that the majority of creatures move in little troops or armies, like deer in herds or birds in flocks. When rabbits travel considerable distances to feed, they proceed across country either singly or, at most, by twos and threes, gradually converging upon the centre of attraction. A careful study of their many paths leaves no room for question upon this point, and it is only reasonable to assume that most other creatures upon the move pursue a similar policy.

There can be little doubt that the uniformity of animal behaviour in this, as in so many other respects, is primarily ensured by a general and inevitable recognition of necessity or desira-

bility. Every animal makes use of the conventional woodland thoroughfares, not because it is the prescribed route from point to point, adopted on account of immemorial custom that has developed into instinct, but merely because the one way in question offers the line of least resistance and has done so since time unknown. A strange animal traversing the country for the first time, more often than not adopts the identical course that a resident would have taken, and for the same reason. This probably accounts for unanimous movement among animals which in their general habits cannot be described as gregarious. When rats or mice vacate dangerous territory *en masse*, they do so because each animal acts upon indications that have become perceptible to all alike. In harvest-time, when precautions against the effects of some impending atmospheric disturbance become advisable, each agriculturist as a matter of course takes the necessary steps to safeguard his property. In all probability every farmer within the threatened area will be more or less similarly employed. There is neither time nor need for preliminary discussion among neighbours. Everyone adopts the obvious course, and the same principle applies in a minor scale among beasts and birds. When fledglings that have not yet quitted their nest in some tree-top, though quite capable of flying, become alarmed by sounds that indicate the approach of a climber—human or four-

footed—they usually remain quiet until the enemy has attained the utmost point that he may be permitted to reach without constituting a menace. They hope, apparently, that he may yet be defeated by the difficulties of the ascent. When the prescribed point is passed, however, the young birds fall back upon their second line of defence, taking sudden and unanimous wing. There are no preliminary squawks and flutterings. The time has arrived for the definite step, which is taken accordingly. The proceeding can be witnessed upon any occasion, while the author of *The School of the Woods* mentions an instance in which three young blue herons took simultaneous action of a less agreeable character, effectually discouraging all further efforts to inspect them and their nest more closely.

Indeed, where the lower animals are concerned, the problem is usually far simpler than that which confronts human beings in times of emergency, since the beast has no occasion to *consider* its course of action. Instinct dictates the one and only policy to adopt. "If the land is unhealthy, clear out," is ancient wisdom, recognized by creatures of all time, and when convinced of the necessity for departure, each little animal steers its way in the direction suggested by its senses as being most likely to provide conditions similar to those which it has been compelled to relinquish. That the con-

clusion reached and consequent selection of destination should be more or less unanimous under such circumstances is both natural and inevitable.

Collective action, inspired by common motive or need, though undertaken upon individual initiative, is habitual among rodents generally. Upon certain days, for no apparent reason, every rabbit in a densely populated bank appears to fancy the same side for food and exercise. This may happen for several days in succession, then, though conditions may seem to be identical, the position is reversed, and for a period—short or lengthy—the popular side of the hedge is entirely forsaken in favour of the other. A trapper once told me that upon a certain occasion he set a number of snares alongside a hedgerow bordering a cornfield in the full expectation of a big catch. A fortnight ensued, during which period he caught not a single rabbit. Then, one morning, when he had practically decided to abandon that particular attempt as useless he found that every snare had claimed its victim. On the preceding night the rabbits, for reasons known only to themselves, had changed their “run” which hitherto had been directly counter to the trapper’s calculations.

One may notice similar examples in the fields at almost any time. Upon certain evenings when all is quiet and conditions seem ideal for feeding and turf-gambolling not a rabbit is visible. Upon another evening, identical in every

respect, the fields are alive with little grey forms scuttling and frisking about in every direction, and one cannot account for either state of affairs. In the language of the country-people, the rabbits are either "in" or "out", and there is nothing further to be said. Many countrymen go so far as to trace direct connection between the activity or inaction of rabbits and impending weather changes. Actually, like the "bolting" and "non-bolting" days that so puzzle sportsmen, no theory as yet advanced stands the test of experience or close observation. That a falling barometer tends to promote torpidity among rodents generally is not improbable—there can indeed be little doubt upon the matter—and up to a certain point the circumstance may serve to account for the curious reluctance upon the part of rabbits to quit their burrows under such conditions, even when attacked by ferrets. It is true that a human being under corresponding circumstances would be unlikely to attach undue importance to barometric pressure. This, however, is only one of the many instances in which animal outlook seems incomprehensible to the human mind.

With regard to the question of animal reaction to sudden or definite climatic changes, it should be remarked that upon quiet days destined to terminate in rainfall at the approach of night, rabbits usually come out to feed during early afternoon, returning to their burrows before the

precipitation becomes imminent. Needless to add, such behaviour by no means necessitates a downpour, any more than a fall of the barometer is invariably followed by rain, but the little animals seldom adopt any other course when a wet night is to follow.

Even more remarkable, perhaps, is the behaviour of birds at the approach of frost, their entire manner undergoing a curious change that is instantly apparent to anyone accustomed to observing their normal attitude. They become silent, are less vivacious than is their wont, and evince a tendency to creep about upon the ground, frequenting ditches and corners where grubs may be found, as though "stoking up" in anticipation of shortage, or seeking places of shelter. It is probable that they are conscious of change in the air; they "sense" abnormal conditions which exercise a depressing or numbing influence upon their vitality. Frost, when it actually grips the earth, has this effect upon wild creatures. In certain cases it may be nothing more than the weakness engendered by hunger, but cold naturally produces lassitude, and the main danger of extreme conditions is the languor that accompanies them. Frost indeed is hostile to life and movement generally, and it is not unreasonable to assume that the highly sensitive and susceptible organization of the lower animal system quickly responds to its influence.

At first sight it seems more than curious that Nature has made no apparent provision for so ordinary a contingency as severe weather, so far as many wild creatures are concerned. The obvious winter provision exists, of course, in the instincts to migrate or hibernate, but those creatures which experience no such inclination are in a sorry case when rigorous conditions interfere with the normal routine of their lives. Now and again one hears of migration movements—presumably the outcome of emergency, anticipated or encountered—undertaken by certain species to whom the proceeding is not habitual, but as a rule there is no departure from general custom in this respect, although the need is made evident by the starving condition of those birds which, deprived of their normal supplies, turn to mankind for relief in their extremity, despite the fact that in many instances such a course amounts to a direct violation of natural tendencies.

The habit of overseas migration is not necessarily common to an entire species. In certain cases its exercise would seem to be optional, but since everything suggests an entire absence of free-will in the matter, one may assume that the tendency to migrate occurs in strains, or that certain individuals are more sensitive than others to the promptings of the impulse. However that may be, it is curious that the inclination to adopt a course that is undoubtedly advisable

should not be general, particularly when neglect of the precaution is frequently attended by consequences so disastrous. It is further matter for wonder that species such as redwings which habitually migrate from northern lands do not extend the movement into even milder latitudes, since these birds are among the first to perish when overtaken by severe cold in this country. Indeed, one might expect migration to constitute the common and natural course of procedure among bird life as a whole, when conditions develop with which they are not prepared to cope. Apart from the abandonment of certain areas by nomadic species, general migration outside the prescribed periods does not appear to be the rule, and one can only assume that weather sufficiently severe to prove fatal to the natural resident is abnormal, or that the occurrence of such a season indirectly serves to curb the prolific tendencies of a race that is not depleted by migration, and to restore the standard of species upon the survival of the fittest principle.

Apart from all debatable questions, however, there can be no doubt that hard prolonged cold is injurious to resident bird life. During the prolonged frost of 1917 a local farmer picked up a number of blackbirds and thrushes whose upper beaks had been broken or bent, presumably through attempting to pierce the frozen earth in search of food. Their soft bills had

proved unequal to the test, and the birds, being unable to eat even the little fare that was available, had perished accordingly. One may assume that many more were affected in a similar or a corresponding manner, and the circumstance goes far to strengthen the supposition that extreme frost constitutes an emergency with which wild birds and even graminivorous rodents are unable to cope, and the plight of the animal at such times suggests the problem of its welfare in the almost equally serious crisis with which it is faced in times of flood.

During periods of abnormal rainfall, when farmers are faced with the frequent necessity of rescuing their stock from inundated fields, one naturally wonders what happens to the numerous wild creatures whose dens and little burrows cannot fail to be submerged before the occupants can realize their danger or make good their escape, particularly in the case of such animals as harvest mice and hedgehogs, which have long since settled down for their winter sleep.

Even creatures which remain active during the winter months must find themselves at times in a condition of extreme difficulty if not actual danger. If one opens a mole-run after heavy rain in almost any flat low-lying field, especially upon clay lands, the passage will usually be found full of water. Indeed, one is always given to understand that the tunnels of moles constitute a natural drainage system, useful, no

doubt, from the agriculturist's point of view, but not quite so convenient, one would have thought, for the moles themselves during wet weather.

Doubtless the mole provides against this state of affairs by excavating tunnels and compartments into which little water can penetrate under normal circumstances, but this seems to offer no provision against sudden and severe floods, when rivers, over-topping their banks without warning, inundate the adjoining fields, or—a more common occurrence—when rainy periods of long duration leave considerable tracts of country more or less under water. Voles are known to vacate their burrows alongside river banks on the eve of a flood, even before there is any apparent evidence of the water rising, trekking to neighbouring ricks, hedgerows or buildings. They sense the impending danger by the exercise of some faculty unknown to science, and one might naturally suppose that moles would do likewise. In their case, however, even assuming that they possessed the necessary instinct which, as already remarked, they appear to lack, the proceeding would be both lengthy and difficult since the migration would of necessity take place along the subterranean highways and not overland, after the reputed manner of eels, or like the rats described.

With moles in the ordinary course of events the necessity for seeking drier ground would not

be likely to arise suddenly. It would only become a matter of expediency as persistent rain gradually saturated the soil. Under such circumstances land that is submerged more or less regularly during prescribed periods might be vacated by slow and habitual stages as the time approached, this proceeding being quite consistent with the mole's methodical habits, since it is addicted to "working" adjoining lands alternately, or in regular rotation.

There still remains, however, the question of sudden and widespread inundation, in which event the animals, presumably forewarned, might seek refuge in high banks and hedgerows, since they frequent these to a large extent at all times, being attracted by the depth of loose earth. Low-lying country, upon the contrary, when fenced only by dykes or wire fences, would appear to offer no avenue of escape. Supposing that the little animals remain upon low ground during wet weather—and it is difficult in many cases to see how they could do otherwise—they must spend a considerable part of their time not only underground, but, like beavers, actually under water. It is worthy of note that while numbers of dead moles may be picked up during periods of drought, one seldom sees them lying about after prolonged wet. From this it may be assumed that rainy conditions prove less disastrous than drought to the mole's economy. Incidentally, during rainy, even as in dry

weather, they gravitate, if possible, towards light rather than heavy soil, and at times may be seen "heaving" very near the surface.

Adult wild creatures are seldom drowned unless taken at some remarkable disadvantage. One and all are strong and fearless swimmers, and even when overtaken by floods, usually succeed in reaching a haven of some description. In the fen districts, rabbits are frequently swamped out of their ground-burrows and compelled by the steadily rising water to swim for life. This they do to excellent purpose, with the result that any hillock in the locality—transformed for the time being into an island—becomes thickly peopled with little grey long-eared refugees. Hares, too, are no mean performers in the water, but it is not, perhaps, generally known that every *bird* can keep itself afloat for a considerable time. This it does, not by paddling like the true swimmers—the web-footed varieties—but by the free flapping of its extended wings, a proceeding which not only serves to keep it above water, but sends it along at a considerable pace. It only sinks when its feathers become sodden, or when too exhausted any longer to ply its wings, the latter having grown heavy from frequent contact with the water. Incidentally, a great deal of moisture is required thoroughly to saturate a living bird's plumage, which, of all natural coverings, is the most impervious to wet. For this reason birds

are more indifferent than beasts to rainy conditions. They will seek food, or come to a bird-table in practically any weather, whereas four-footed creatures upon the contrary, usually prefer to remain in a place where they are dry and comfortable till the storms roll by. Foxes seldom commit depredations on a wild wet night, while everyone who has kept hedgehogs in a garden under semi-wild conditions has discovered that they seldom stir from their sleeping quarters during inclement weather. Rabbit-trappers anticipate only the lightest "catch" during stormy periods, the rabbits sometimes remaining underground for days, until compelled by hunger to brave the elements. Indeed, no birds or beasts are seen to advantage when rain is falling, and for this reason, at any rate, the "fair-weather" sportsman or observer is to a large extent justified in his attitude, for not only does the pursuance of his craft under wet conditions involve discomfort, but it is also unproductive of satisfactory results.

•

CHAPTER XI

STRATEGY

THE previous chapter upon reaction to emergency dealt almost exclusively with the more or less calculated measures adopted by wild creatures during periods of general distress or crisis, no reference being made to their behaviour with regard to sudden and imminent danger. At first glance one might be disposed to think that the subject could be dismissed in a sentence or two. Action in such cases must be spontaneous, the animal either resorting to flight—its usual course when taken by surprise, no matter how fearless its disposition—or adopting a defensive attitude when precipitate retreat is impracticable.

As a rule, an animal's first line of defence offers little scope for thought, even according to its own limited standards, while in many instances the danger is over almost as soon as incurred, the creature concerned falling or escaping, according to the vicissitudes of fortune or its own agility. It is when the crisis proves more than momentary, when pursuit is prolonged, or when it perceives the approach of danger to counteract which some policy must

be devised, that ingenuity—or the lack of it—may be displayed.

Even so, the methods adopted, though efficiently carried out, may amount to nothing more than purely natural artifices, commonly practised by the race of animals in question, and, therefore, requiring little mental effort upon the part of the bird or beast. It is almost a platitude to remark that a line of conduct suggested by mere instinct cannot be regarded as strategy, although such cases are not infrequently cited as providing proof of animal guile.

By way of example, one might again consider the famous broken wing trick, so frequently turned to good account by parent birds in moments of extremity. Were this the invention of an individual, it would amount to strategy of no mean order. It has been so long employed, however, by birds of so many species, that the practice has become purely habitual, and is adopted as a matter of course whenever occasion arises. It is doubtful whether the proceeding has any more significance to the individual practising it than the use of certain materials in nest-construction. It would not occur to the bird to act otherwise. Real artifice would be displayed only in the devising of some entirely new ruse to meet the situation—if, for instance, instead of fluttering along or trailing a wing, the bird rolled upon its back or screeched, or diverted attention by executing peculiar gyrations

in the air. That it never resorts to an original device, merely going through one of the same pantomimic performances that its ancestors have given under similar circumstances for untold generations, indubitably proves the mechanical nature of the proceeding, the main interest of which lies in its origin and development.

Doubtless it evolved after the usual manner of habit, but one would like to be able to trace the point at which actual *deception* entered. Its origin is comparatively simple, since one can easily imagine the parent bird attracting the attention of an enemy upon itself by the intervention of its own body, and even moderating its pace to invite pursuit. The trailing of the wing, however, involves so definite an act of simulation that it would be difficult to decide which constitutes the greater source of wonder—that it should be devised by a bird in the first place, or that the habit should have been so commonly observed.

An animal appears to estimate the capacities or mental outlook of an enemy by its own standards, and it is remarkable that birds should have first discovered and then grown to recognize the fact that a pursuer would be more likely to follow a wounded than an uninjured creature. The discovery could scarcely have been the outcome of sufficient experience to evolve a habit, since few individuals would survive such an adventure, and certainly not twice

in a lifetime. It is equally certain that few birds have *seen* others pursued by natural enemies to such an extent that their actions could be common knowledge, even to the point of counterfeit. The one possible but far from probable solution might be found in the suggestion that conflict between members of their own race and inevitable pursuit of the vanquished, if injured, may have engendered an instinct which has few parallels in Natural History.

It is worthy of remark that this most curious ruse is always practised in defence of young and not of self. The one artifice employed for the latter purpose that at all resembles actual simulation is that of shamming death. One hears and reads a great deal about this trick, but seldom encounters examples of it. Obviously it is not habitual to many beasts—in the case of adult birds there are few if any recorded instances—and when examples occur, one would be justified in attributing them to some original streak in the character of the animal concerned. One would also venture to suggest that no example of feigning death should be accepted unless the principal actor were an *uninjured* animal. Temporary loss of consciousness may easily be mistaken for a deliberate assumption of the state it so closely resembles. Ghastly instances of animals left for dead that have recovered are numerous, while game that has been shot or taken from hounds or other dogs in an apparently lifeless

state has been known to revive, and though at times one may have been inclined to attribute the circumstance to a clever piece of acting, consideration and accumulating evidence in support of the opposite view has led to the conviction that in all cases within personal experience the animal's state has been the genuine result of its physical condition.

The opossum is the proverbial past-master at this craft, which in this particular animal has presumably developed into an instinct somewhat akin to the broken wing trick. When studying the evidence upon the point, however, one is struck by a somewhat significant coincidence. In a work of reference, old but classical, it is asserted that the opossum pursues the trick of "shamming death pertinaciously". The writer then proceeds to state that the animal is also "very tenacious of life". In view of the occasions upon which foxes have returned to life while actually undergoing dismemberment, rabbits when suspended from a peg, weasels or cats when consigned to the vermin rail, one is justified in wondering how often history may repeat itself in the case of an animal that is notoriously hard to kill. The feigning of death could not do otherwise than violate all the natural impulses of any creature, even if it so far recognized the state of death as to counterfeit it. Considerable resolution and command of nerve would also be required, and that at a

time when the animal is in a state of extreme panic or terror. The courage demanded of it would also be stupendous, when instinct and every natural inclination urge the last grain of endeavour that can be extracted from every muscle in the effort to escape from what it most dreads—actual contact with its enemies.

Young birds of certain species, notably ravens, undeniably impart the impression of feigning lifelessness, since, not content with cowering flat in the bottom of the nest, they lie upon their backs—the common attitude of a dead bird, but seldom adopted by the living except in the last desperate stage of conflict when endeavouring to strike upwards at an antagonist. Since the young ravens make no attempt at active defence when in this state, their motive cannot be attributed to any such intention, and one can only assume that during that stage of their existence, while still helpless but old enough to appreciate danger, they possess an instinct which ceases to operate later in life. It is possible that the same impulse occasionally asserts itself in adult creatures at moments of the utmost extremity, and is tried upon the same principle as the proverbial straw at which the drowning clutch. All considered, the suggestion is perhaps more acceptable than the possibility of deliberate artifice, to which idea so many objections can be raised.

Closely allied to the foregoing practice of shamming death is that of close concealment.

Apart from the act of dissimulation which is not required, qualities of a corresponding nature are called into play, and the gulf between instinct and intent once bridged, the one habit might easily develop into the other. Reasons for the employment of such tactics have been suggested in a previous chapter, but there are occasions upon which the policy is pursued to such lengths that it amounts to an example, not of exaggerated instinct, but of resolute adherence to a deliberately adopted rôle.

The origin of "playing possum" is thus easily traced to a common source, but the trick of concealment, as already stated, is in itself a purely instinctive proceeding, entirely devoid of guile—that is to say, unless the bird or beast could be aware of its own protective colouring, to which alone the policy owes its chance of success. This is improbable, although it should be remarked that concealment is never attempted by creatures among unsuitable surroundings. A partridge would not squat closely upon a road, or upon a field of closely cropped grass, from which it seems apparent that the bird recognizes the advantages of cover. Upon bare ground it acquires no sense of security, but whether it deliberately connects the latter with the consciousness of invisibility is another matter. That the ostrich does so when it lowers its head is tolerably certain, and it is noteworthy that the partridge, when visible, never permits close

approach. Unlike the case of the rabbit, previously discussed, it can scarcely believe itself seen because seeing. The extreme wildness of partridges late in the season proves that the birds are aware of a hostile advance while the latter is still distant, and there is no reason for assuming their senses to be less acute upon one occasion than another.

An animal certainly realizes the advantages of cover. It also has a shrewd idea as to whether it is seen or unseen, and in this connection there is a somewhat interesting distinction. If conscious that it is visible and has become the object of attention, it immediately takes flight. If invisible, although well aware that it is the object of *search*, it may remain for an incredible time in a position that it would not consider tenable for a moment if conscious that it was detected. In an instance recently witnessed, a cock pheasant remained squatting in the shelter of a bramble-bush scarcely a square yard in extent while a spaniel which had hunted its line for a quarter of a mile careered around within a few feet of him, and two men beat every other bush in the vicinity, ignoring the one which contained the bird on account of its negligible dimensions.

The example, though by no means unusual, deserved record upon this account. The pheasant was obviously executing a definite plan of campaign. Conscious of the dog's approach, while

still unseen it had run a considerable distance, then, taking a short flight, alighted in the bush, and aware, either consciously or instinctively, that it had left no foot-scent, staked everything upon the efficacy of its hiding-place. Had it left a direct line to indicate its whereabouts, being conscious of pursuit it would have taken wing long before its enemies had drawn dangerously near. Again, if taken by surprise at close quarters with no preconceived plan of action, it would have burst into flight when first aware of danger.

If allowed time for consideration, an animal certainly exercises at least a measure of discretion. At the same time, unless it is a creature possessing abnormal intelligence, it will devise no original plan of escape. The course that it adopts will be consistent with its racial instincts, individual acumen being displayed merely in the choice of its tactics in relation to the occasion. A pheasant might run, take flight, or squat upon the ground when confident of avoiding notice, such being the tactics prescribed by instinct to meet the occasion, and considerable shrewdness might be displayed both in making the decision and in carrying it into effect. It would not occur to the bird, however, to fly up into a thick ivy-covered tree and conceal itself among the dense evergreens where no dog was likely to get wind of its presence. It might be addicted to roosting in a spot precisely answering to that description,

but its instinct would lead it to regard the place in no other light than that of sleeping quarters. A tree would represent the conventional refuge by night alone, and if found in such a spot during the day, one may rest assured that the pheasant has taken up its position there for other purposes than with an idea of safety. It would probably be merely seeking grubs or berries.

Such a proceeding upon the pheasant's part would, if adopted, constitute no violation of instinct, but rather of precedent, deliberate departure from which is scarcely possible to the wild creature—a point which cannot be over-emphasized. Indeed, so rigid, or perhaps so self-sufficient for all natural purposes, are the prescribed methods of defence placed at the animal's disposal, that its inability to make any advance upon them is more remarkable than any example of original guile that the most extensive experience could produce. One might, perhaps, have expected bird or beast to accumulate wider knowledge and greater powers of perception in the course of its long warfare with man and its wild neighbours. Upon the other hand, it is no more extraordinary that the animal should be incapable of solving abstruse mental problems than that man should be unable to fly without mechanical aid, and the greatest wonder actually lies in the fact that the animal, handicapped by numerous restrictions, should so frequently succeed in the struggle.

It is difficult to realize how little the wild creature actually knows or intends, or how large a part chance plays in its achievements. Upon numerous occasions one is liable to attribute foreknowledge to an animal when some course of action adopted from purely natural motives and without premeditation of any sort, results in developments advantageous to the creature concerned. In a word, indirect consequence must always be distinguished from the outcome of preconceived plan if one is to form a correct estimate of animal motive. The hunted deer, when leaping the muddy dyke in which its pursuers were inextricably engulfed, had no idea of luring them to grief. Its one object was to regain the other side, nor would it entertain a notion that the hounds would be incapable of following suit. The fox that descends the cliff by paths that present no difficulties to his cool head and supple limbs can scarcely be expected to realize the peril into which he is leading his followers. The rabbit swerves as the gun is fired, not with intent to elude the charge, but because its runway turns at that point towards the hedge. The action of the rabbit indeed may not entirely be devoid of natural craft, since the little beast is impelled by instinct to take cover with all possible dispatch. It probably regards the whistling storm of shot as something akin to the falcon's swoop, and the sudden baffling turns that it executes at times may be

identical with the erratic flight of the snipe before the latter turns into the wind and embarks upon a direct course.

The zigzag flight of the snipe before getting under full headway deserves closer attention, not so much on account of the acrobatics which are comprehensible, since apparently precautionary, as the limited duration of the performance. There is no obvious reason why the snipe should *cease* to turn in air when in full flight—often at the moment when another divergence from its direct course might serve the very purpose of its previous manoeuvres. The bird abandons its tactics when it has attained a certain distance, whether fired at or not. The hurtling of pellets, therefore, through the air across its line of flight cannot necessarily be responsible for its change of direction, although undoubtedly producing that effect at times. One is left in doubt as to the character of the danger that it anticipates and would avoid. It may be assumed that, were the swoop of its natural enemy the falcon apprehended, the bird would display a greater reluctance to leave the ground, even discounting the different angle of approach—a point that the avian mentality might conceivably appreciate. Upon the other hand, the policy pursued so strongly suggests tactics to counteract the attack of a winged assailant that one of two conclusions appears to offer the only solution. In the first place it is possible that the old cus-

tom of falconry so general over an immense period of time, evolved the inseparable association of man with the hawk, from which the gun differed too little upon all essential points to foster the growth of a new instinct, the approach of man, therefore, being still countered automatically by anti-hawk tactics. Or, secondly, there is the suggestion—less palatable but equally probable—that the snipe is capable of no discrimination whatsoever; that it employs the same artifice to meet any danger, irrespective of its character, and that it possesses, indeed, but one natural means of defence.

Whichever supposition is correct, no light is thrown upon the snipe's habit of abandoning its strategic flight before the danger is over. If anything, however, the policy suggests a purely *natural* line of conduct. When confronted with sudden and desperate peril the invariable law of the wild is to take precautionary measures first—by dint of dodging, precipitate flight, or counter attack—then to review the situation from a standpoint of safety. Such might easily be the attitude of the snipe. Startled into motion by the realization of an enemy's proximity, it anticipates the possibility of the worst by prevention. In other words, instinctively fearing the falcon's swoop, it employs the natural foil, until, realizing that no winged enemy holds the field, it discards artifice in favour of straightforward flight. Its failure to provide against the

infinitely more deadly swoop of the shot may be attributable to the operations of yet another instinct. Finding that the enemy is merely human, it falls back upon the simple policy of speed which bird and beast appear to consider the most effective means of escape from mankind—doubtless a survival of the days when the arresting power of gun-powder was unknown and swift legs or wings usually proved more than a match for stones or arrows.

It seems improbable that any idea of baffling the gun can enter into the bird's calculations, since realization of the weapon employed should be accompanied by a corresponding knowledge of its limitations. Such at least is the rule in the great majority of cases. Even the street cur shrewdly estimates the range of the missile directed against it, or the line of the approaching car. Its wisdom, however, is that of experience, hard, but seldom fatal in the former case, in which respect the domesticated animal is differently situated from the wild creature who usually pays for error with life.

The cost of experience, particularly with regard to the gun, is doubtless the reason why measures to counter its deadly efficiency are so slow of development. Comparatively few animals that make its intimate acquaintance—the one way by which the necessary wisdom could be learned—survive the lesson, the list of wounded that ultimately perish being long, while those which

escape unscathed retain neither a due appreciation of their good fortune or any especial reason for committing the experience to memory, since it amounted to little more, according to their lights, than the casual avoidance of a danger the magnitude of which they scarcely even realized. The same principle applies to every peril encountered by the wild creature. If it escapes, it finds no occasion to improve upon tactics which stood it in good stead. If it falls, it enjoys no further chance of profiting by the knowledge acquired, and thus little advance is made in the way of natural defence.

Somewhat different is the position of those which attack, since methods once employed with advantage are naturally repeated. Nothing succeeds like success. Experience is added to experience, and upon this account birds and beasts which live mainly by aggression display greater finesse in their craft than those whose intelligence is only called into requisition for defensive purposes.

Necessity is the mother of invention, and hunger inevitably sharpens the wits of a hunted animal. When one expedient fails, it has recourse to another, and so, not only acquires additional skill and versatility, but learns to adapt its methods to circumstances. Discovery may quickly engender habit, and as a rule the origin of a clever hunting trick may be traced without much difficulty. A mink, when hunting

a hare, seldom wastes its energies in a stern chase, which, though tolerably certain to terminate successfully, would prove both arduous and lengthy. It may commence operations by pursuing its victim around the circular course which the hare is certain to describe, but for one round only, in order to discover the line. Then it follows the back-track and meets the hare who is probably so demoralized at the unexpected encounter that she puts up little further resistance.

The contrast between the respective mental attitudes of the two animals is remarkable. The mink has so long studied the habits of his game that he unhesitatingly stakes his chances of success upon the hare repeating the identical circuit, and after employing the trick successfully once or twice, he becomes an expert. The stratagem has so long been in use that it has developed into an approved method of hunting, although in the first place it doubtless evolved from a discovery made by an individual, either through accident or perspicacity. A mink that had lost the line of his quarry might still have been endeavouring to recover it when the hare solved the problem by appearing behind him. When next at fault, remembering previous experience, he would cast backwards instead of forwards, and so the proceeding would become habitual. With a few animals acquiring the knowledge, its transmission would follow as a matter of course. It is not surprising, therefore, that every mink—

and almost every weasel for that matter—has now played the same game upon occasions all down the generations, and in that respect he has the advantage of his victim, for the hare, although countless numbers of her race have suffered the same fate, is never prepared for the policy. She neither anticipates it nor has cultivated an instinct to counteract it, because, once again, few survive the experience.

It is probably upon this account that few animals possess sufficient intelligence to cope with the combined drive and ambush, although rapacious creatures when hunting in company appear to understand the principle, at least, in part. Upon the other hand, an animal that has once intercepted the game that was being pursued by another endeavours to repeat the performance upon the earliest possible occasion, and, indeed, all rapacious creatures, whether wild or tame, display an astonishing readiness to profit from any experience that facilitates their craft.

There are animals that largely subsist upon the efforts of others whose skill they cannot emulate, but whose might or guile is inferior to their own. Probably there is no vestige of truth in the story that the fox by cunning behaviour of an unpleasant character deliberately causes the badger to vacate his burrow. That the badger takes his departure when the fox establishes himself as a near neighbour is probable.

He does so, indeed, because his fastidious tastes are outraged, but the offence was unwitting upon the part of the fox, who none the less derives full benefit from the more industrious animal's labours. There are many instances, however, of intentional and undisguised piracy, the sea-eagle providing, perhaps, the stereotyped example when it annexes the fish that the osprey has just extracted from the water. Unable to emulate the fish-hawk's example, the eagle adopts the easier course of allowing the more proficient bird to do the work, then depriving him of the fish before he can enjoy the fruits of his labours. In this case the proceeding is sufficiently common to be considered habitual, but it is probable that many animals, particularly when debilitating age is creeping upon them, or when they have sustained some injury, supply the deficiency wrought by time or accident by cultivating similar tactics.

When watching the actions of almost any wild animal while feeding, it is quite clear that it has an instinctive fear of robbery. It imparts the impression of seldom allowing itself time to enjoy the meal, casting frequent hurried glances around and bolting each mouthful in a manner that suggests a genuine haste quite innocent of greed. It would seem also, that each creature as far as possible selects for his hunting that particular hour of the twenty-four when he is least likely to run foul of another. In this

respect, indeed, there appears to be a natural provision that averts the possibility of undue overlapping. Night is the time when terrestrial hunters are in evidence. It has been so organized, therefore, that birds of prey, which kill in the air but must feed upon the ground, utilize the daylight for their activities. The one feathered night-killer of any consequence is the owl in his various forms, but his victims are usually of a size that permits him to carry them to some safe platform among the branches for demolition. Even the stoat, it will usually be found, does the greater part of his killing by daylight. One rarely hears the death-cry of his principal victim, the rabbit, after dark when the sound would be most noticeable, and in this exception to the general rule there may well be method, or the fox would obtain an easy living at the stoat's expense. That the "wily one", even so, frequently forestalls his highly skilled and indefatigable little fellow-woodsman is more than likely, and in some parts of the country to-day, the fox has discovered an even more profitable source of supply in the rabbit-trapper. In helping himself to the trapper's spoils he displays both boldness and address, and though he not infrequently pays the penalty by taking the fatal step himself, an old fox who has survived the experience may continue his depredations unscathed for an indefinite time. The scream of a rabbit soon brings him upon the scene, and

now and again one hears of a fox that executes his raids in broad daylight. Not long ago a trapper told me that upon one recent occasion he was actually setting his gins when he heard the cry of a rabbit already caught in an adjoining field. He went immediately to secure it, and was only just in time to frustrate a fox in the very act of forestalling him. For weeks that same fox levied a nightly toll upon his "catch", extracting one or two rabbits, unless any birds—which too often fall to the trapper's share—happened to be caught. In that event the fox invariably preferred feather to fur, even if the birds proved no more significant game than blackbirds, leaving the rabbits unmolested. This was interesting, since, as a rule, a wild fox might be expected to select his more natural game when given the choice. It seems, however, that some variety in the bill of fare is welcomed also by the vulpine palate.

An animal's idea of a trap must depend largely upon its standard of intelligence. That it regards the contrivance as a living object is unlikely, and one is probably correct in assuming that it figures in the mind of bird or beast in the same light as any inanimate article, such as a stick or a stone, that is powerful to hurt or destroy. When the object is visible the creature is certainly aware of its limitations. It realizes that danger lies in contact alone and, having no fear of the contrivance itself, does

not hesitate to inspect it at tolerably close quarters. A row of unset traps conspicuously placed around a valuable crop to serve as scarecrows would have no deterrent effect. The animals that it was desirable to scare would avoid the objects but otherwise disregard them. It is further doubtful whether human agency is even recognized in the contrivance, unless by animals possessed of a remarkably shrewd perception. Alarm may indeed be taken at the human scent, but only in so far as it is held to constitute a danger in itself. The man would be feared upon his own account and not with a view to any possible connection with his dangerous devices. The trap would have no more significance in this respect than innumerable objects in the vicinity which would also bear the human taint but would inspire no terror.

All considered, it is remarkable that an animal of average mental ability should have so little rather than so much intuitive knowledge of the entire principle of the gin. The peril might usually be avoided by adopting the most elementary precautions, or by the exercise of the least initiative. A rabbit, for example, receives ample warning of the trapper's activities, and up to a certain point it takes note of ominous scents and sounds. When gins are set late in the afternoon—the period during which the game is growing wakeful at the approach of night—few are caught as a rule. The warnings are

just as obvious earlier in the day, but are usually disregarded. This may be due to the rabbits' torpid state at noon. It may be largely a matter of memory, but that is beside the immediate point. The fact remains that the animal, even if it forgets the indications that heralded the trapper's arrival, is kept constantly aware of his presence, and to some extent endeavours to avoid the engines of torture that lurk in its tracks. That it knows what to look for and where to anticipate danger is apparent, but unless actually aware of a trap's position, no animal appears to conceive the original notion of *changing its course*, and, by abandoning all beaten tracks for the time being, eliminating all risk of danger in its highways. A human being would adopt this simple precaution as the first and most natural resource, and the animal's failure to do so provides yet another outstanding proof of its mental limitations.

One is frequently compelled to descend to the lower grades of life for examples of perspicacity, and in the above connection the humble mole often proves not the least knowing of animals. Usually the little sooty excavator may be caught with ease. His outlook, like his needs, is limited, and the clockwork regularity of his habits proves his undoing. There are moles, however, particularly those enterprising individuals which invade gardens and work such havoc with lawns and flower-beds, that resolutely defy capture,

generally by adopting the obvious tactics suggested above. Wherever the despairing gardener places his trap, the mole avoids it by burrowing a fresh tunnel under or round it, filling it with loose earth in the process. That the mole regards the metal obstacle in its path as a source of danger is certain, and experienced mole-catchers frequently outwit a wily individual by setting the trap in a fresh place and obscuring the passage with loose earth, so disguising the obstruction.

That the trap is regarded by animals as an independent agent is further suggested by the fact that neither beast nor bird employs the aid of any mechanical device when hunting. The rapacious creature has no idea of furthering its end even to the extent of placing a crude obstruction in the runway of the animal that it intends to waylay, although its chances of success might be considerably increased by such means. Barriers are often constructed for defence or concealment, as when the magpie barricades its nest, or the bottle-tit covers the entrance to her nursery, but no hunting fox, for example, would possess sufficient craft to scratch earth over the hole in the fence for which the rabbit that it intends to chase is certain to run. The animal invariably constitutes its own trap, nor has it any notion of devising another. It may be true that the more supple-witted creatures now and again lay baits to lure others within spring, but

if such instances ever occur, they are probably the outcome of accident rather than design. A beast of prey might lie down within springing distance of the carcase upon which it had been feasting, and strike down any other animal that endeavoured to secure a share, but its action would constitute mere defence of its own property rather than intent to entrap the other. Full fed itself at the moment and with its supply of meat still unexhausted, it would not even experience any desire deliberately to decoy further victims within its reach.

The practice of mounting guard over food is common to many birds and beasts. The nearest approach that an animal makes to *trapping* its prey is by lurking in ambush beside a game-path or water-hole, when, as already remarked, the beast depends upon its own claws to effect the capture. The most interesting point lies in its knowledge that the path will be utilized, although, were the case reversed, it would not recognize the advisability of avoiding the track as a source of danger—another example of the hunter's guile exceeding that of the hunted.

It is perhaps curious that the principle of a spider's web should have no parallel among animals of a higher order, and that in this respect, again, a creature so nearly approaching an insect should rather resemble man in its methods for circumventing other living things.

Its actions, of course, are as purely automatic as those of insectivorous plants, but there is, none the less, an essence of calculation attached to the spreading of a spider's web that allows for at least some measure of individual skill.

Incidentally, not the least curious thing about the spider's entanglement is its success. That it must be imperceptible to the insect eye is obvious in view of its numerous and varied victims. Yet, comparatively speaking, there is nothing quicker of sight than a fly, and its fear of the spider is sufficiently apparent. One can, therefore, only attribute the efficacy of the gossamer—so conspicuous to a human being—to lack of discriminating ability upon the part of the insects that it ensnares.

In the wild, cunning may be summarized as the outcome of a single desire—that of self-preservation, whether it takes the form of defence, or of attack for the purpose of obtaining food. It is doubtful whether any animal schemes for other purposes, or devises means of vengeance, numerous as are the instances cited in proof of this supposition. The elephant that discharges a trunkful of cold water over an enemy, or the dog that settles an account with its teeth when chance occurs, probably acts without premeditation. Animosity is revived at sight of the object and the opportunity for gratifying it seized. Even the wounded beast that doubles upon its

tracks and waylays its hunters, after all, only acts in self-defence, although much is said of its "vindictive" behaviour. It only attacks those who follow it, and when it doubles, is usually obeying the first instinct of the hunted animal which takes this precaution against pursuit. It does so in order to be warned of the enemy's approach, and probably does not intend counter-attack until incensed at sight of its assailant at close quarters. Even so, the guile of the animal is frequently exaggerated. It may be lurking in thin cover where least expected, and upon this account is able to launch its charge with more terrible effect, but there is little likelihood that the pursuers' expectations as much as figure in the animal's plan of campaign. It takes cover in an unlikely place because it feels unequal to further progress, and the action perhaps serves its purpose, because unanticipated, more effectively than the deepest guile displayed in the elaboration of a deliberate plan.

Indeed, the keynote of animal craft is single-mindedness. Each creature, when in need, adopts the course that Nature suggests, without desire or ability to supply a reason for assuming that its action will have the required effect. Many people, perhaps, will regard this point of view as somewhat disappointing. To maintain otherwise, however, is to place the beast or bird upon an intellectual plane which, obviously, it

cannot occupy—in brief, to adopt the animal's own policy of estimating the actions and motives of those with whom it comes into contact by no other standards than its own.

CHAPTER XII

ORIENTATION AND MIGRATION

SETTING aside for the moment all controversial questions upon psychological matters, it becomes necessary to consider the animal in the light of an intricate and highly developed piece of mechanism, embodying the functions of more than one infinitely sensitive instrument. Reference has already been made to the animal's susceptibility to weather changes, in which respect it appears to possess the instinctive foreknowledge evinced by certain plants such as the scarlet pimpernel, wood-sorrel and chickweed. In addition to the capacities of a barometer, however, it is further enabled, in a limited sense, to discharge the duties of a compass, or, more literally, an indicator of any direction in which it is desirous of travelling. Distance appears to be immaterial to the operation of this sense, since it can scarcely be classified as an instinct, and so far as can be estimated it is the common property of beast, bird, insect and reptile alike.

Apart from its actual existence, which is too apparent to be challenged, nothing is known of this extraordinary faculty. Indeed, so far as

scientific analysis is concerned, it might be dismissed in a sentence or two as synonymous with the ability to steer an uninterrupted course through unknown country, commonly exhibited by native guides, the secret of whose power is inexplicable even to themselves. Men who possess it usually accept it without question, being for the most part representatives of a type whose instincts are closely allied to those of wild creatures. Their attitude, indeed, closely resembles that of the shepherds described in a previous book, *Dartmoor in all its Moods*. These men are frequently overtaken by dense mist when in pursuance of their duties, and for their own part are quite unable to extricate themselves from the dilemma in which they are placed. It is their custom, however, to place the onus of responsibility for the homeward route upon their ponies, whose ability to steer an unhesitating course is taken for granted, being regarded as no more remarkable than their own helplessness. It is tolerably certain, however, that not a shepherd upon the hills could supply a reason for so confidently assuming this sense of direction in the animals concerned. It is merely a *sine qua non*, as essential a trait of equine nature as natatorial ability is inseparable from a fish.

The foregoing instance, however, merely serves to illustrate the primitive human outlook upon recognized fact. Fog being a matter of

vision, in no way affects the animal's sense of orientation, of which in this case the domesticated horse does not provide a particularly apt example, since its course, though unhesitating, is prescribed. For the most part, it follows tracks, crosses streams and obstacles at familiar points, and the ease with which it selects its path might as conceivably be derived from an intimate knowledge of the ground as from actual sense of direction. The mist presents no difficulty since at all times the beast follows the guidance of other senses than sight. An animal never forgets a trail that it has once traversed. When picking an almost imperceptible path across rocks or heather, no matter in what direction one is heading, it is noticeable that an accompanying dog seldom diverges by as much as a foot from the ill-defined but easier course indicated by the track. This is not a matter of orientation, since the line pursued may have no definite direction, and, so far as the dog is concerned at any rate, the destination is entirely unknown. It is merely a matter of adhering to a way which to human eyes is indistinguishable, although easily discernible to the animal by means of faculties that are not possessed by mankind.

A blind man who knew his road would experience no inconvenience if overtaken by mist or darkness, and for the same cogent reason—that he is not dependent upon eyesight. It is not

perhaps realized that in this lies one of the essential points of difference between human beings and animals. There are many observant naturalists who attribute the orientation of birds to the employment of keen vision, the recognition of landmarks and the exercise of memory. That birds recognize points in the landscape is probable, and there can be no doubt as to the keenness of their sight. This entire subject of vision, however, will be discussed in the ensuing chapter.

For present purposes it is sufficient to suggest that outstanding features of the country are more useful to avian visitors from overseas than to resident birds. Strangers frequently alight in conspicuous trees or coppices from whence to take their observations, and when visiting flocks remain in a neighbourhood for a few days, these places appear to serve, if not as actual indications of locality, at least as temporary headquarters. It seems improbable, however, that resident birds, or those familiar with the country, should require any aid to their sense of direction. Such assistance would serve no apparent purpose. Even were sight essential, natural features, conspicuous to a man, would probably prove meaningless to a bird which could scarcely be expected to possess any idea of comparison or disparity, while, given a clear visibility, distinguishing marks would be useless to eyes before whose clear gaze the entire wide landscape would

lie like an open and familiar book. Were visibility bad, upon the contrary, neither landscape nor outstanding features would be apparent, while the idea as a whole too strongly suggests the map or chart to be quite compatible with avian methods.

All considered, therefore, while recognizing the utility of vision as a subsidiary factor, one must look farther for the key to the great mystery. One would suggest that in its *indifference* to sight lies the power, common to the bird and blind man alike, of recognizing landmarks, not because they serve to indicate its route, but because they constitute conventional halting-places. Remove the wood or tree over which the bird passes—alighting or not according to its mood—and its line of flight would remain unaltered. Erect some prominent obstruction, such as a new building, in its course, and it will not be deterred by the innovation. Indeed, one might almost believe at times that houses actually constitute avian landmarks—did such a system exist. In new countries where homesteads have sprung up between great lakes, wildfowl, unapproachable upon the shores, are often shot from “blinds” no less conspicuous than farm buildings as the birds pass to and fro upon the air-ways that have so long been used that digression would constitute a departure from habit beyond the avian capacity.

Air-ways are no less pronounced than other

routes of progression, and the curious irregularity of their course at times seems singularly inconsistent with the proverbial crow's flight from point to point. Unless actually crossing vast tracts of water, a bird's flight is seldom direct for any considerable distance. It is only necessary to watch the approach of some small denizen of the garden to obtain a tolerably accurate impression of the tactics adopted. It is usually a matter of stages, from one favourite bush to another, and the same tendency is displayed by the larger *aves* when covering greater distances. Frequent breaks appear to be the rule of almost any overland journey, and the alighting-places are selected with almost the same regularity as prescribed halts upon the old coach roads. There are certain trees or patches of wood in which they continually alight, others in which a bird is rarely seen, since these latter are situated, like out-of-the-way houses, at an inconvenient distance from the beaten tracks.

These prescribed routes and resting-places are observed, not only by resident birds in their comings and goings, but by wandering "tramps" and migrants alike. In late summer, when one's own swallows have taken wing, it is not unusual during the space of a week or two to see their favourite perches along the tennis wires occupied for a few hours by some passing company which has selected that particular spot in preference to any other in the neighbourhood. The precise

advantage offered by these favourite halts may be apparent to nobody but the birds themselves. It is no more extraordinary that they should be imperceptible to mankind than remarkable that a bird should be unable to appreciate the points that especially commend a certain inn. The prescribed routes pursued by migrants or wide-ranging resident species may be preferable for many reasons, prevailing wind-currents among other things being doubtless taken into consideration. These probably play a larger part in the disposition of bird-ways than the casual observer might naturally suppose. Certain areas are always more breezy than others, irrespective of altitude, and even the sun may exercise a measure of influence.

There is need to discriminate between the true direction sense and topographical knowledge with which it may easily be confused. Resident animals usually possess both ; a human being may acquire the latter and remain entirely devoid of the former. That the operation of the one may be offset by the other is quite conceivable. Were a bird or beast desirous of attaining some goal across strange country, it would obey the dictates of its instinct and take the most direct line from point to point. Were the land familiar, upon the other hand, the animal, for whom neither time nor distance exists as a practical consideration, would almost certainly pursue a devious route of its own, by way of many points

that it was in the habit of visiting when upon shorter excursions. Indeed, it seems possible that the resident animal as a general rule has no occasion to employ the actual orientation sense, since its knowledge of its environment is both intimate and extensive. As usual, however, in such questions, the precise point at which instinct supersedes knowledge is not easily determined. That the greater number of four-footed creatures primarily work upon their experience of the country is certain. When a dog is left to find its way home, or takes a walk upon its own initiative, like the moorland pony in the fog, it proceeds along familiar tracks from which it does not diverge unless to avoid contact with someone who contests the path. It does not think of cutting corners or by any means shortening the way, unless it has been in the habit of doing so upon previous occasions when accompanied by its owner. Yet instances of a dog's return to its home over long unknown distances have been related too frequently to require repetition, and upon many such occasions it seems certain that the animal's homeward route could not have been that by which it had been conveyed. It had probably found no previous need to employ its faculties for orientation, but the ability was there for use when required.

The case of the fox is similar. When hunted, it usually adheres rigidly to its own haunts, the amount of country that it covers depending

mainly upon the age and experience of the animal. When a fox heads for some distant area—makes a long point in sporting language—one may safely assume that it is a native of the locality to which its course is directed. This type of fox—known as a “traveller”—adopts very different tactics from the local animal, seldom lingering to try earths or even to explore other possible avenues of escape. Its one aim is to reach land that it knows, and in the pursuance of this end no apparent difficulty is experienced. There is no hesitation as to its course. It seems scarcely possible that the fox, intent all the while upon the amorous business which in such cases has usually been responsible for his journeying from home, took accurate account of the country through which he came. Indeed, it is probable that he described a veritable maze in the course of his quest, and in such a moment of extreme emergency a human being under similar circumstances would certainly forget any detail that had been committed to memory. The fox, however, labours under no such disadvantages. That he forgets is not improbable, for detailed memory where animals are concerned is largely a matter of association, nor is he likely to recall a single vista of the homeward way until it actually opens before him. He will be none the less certain of the line upon that account, and no matter how often he may be “headed”, or diverted from the direct course, will never lose sight

of his original purpose or err with regard to direction.

In many respects the achievements of a beast when so placed are more remarkable than those of a bird upon a cross-country flight. The latter, when once aloft and under full headway with a favourable wind at its back and the green earth dim below, should find no difficulty in steering for a goal towards which it is impelled by forces as resistless as magnetism. There are no strange features or obstacles by which to be diverted in the wide skyscape, even adverse weather conditions being seldom encountered except in the longest flights, for the bird is usually more or less assured of a clear voyage before taking wing. The overland journey of a fox or dog across strange country may seem insignificant by comparison of mileage, yet viewed in a certain light, it may be regarded as an even greater performance, since the objective is attained in spite of difficulties and distractions calculated to upset the most carefully conceived campaign. The task of steering a course through fog is easy when compared with that of proceeding through blind or broken country. In the one case it may be possible to maintain a sense of direction if deviation of any kind can be averted. When frequent turns are unavoidable, however, any idea of direction is inevitably lost to the utter stranger—or would be were he subject to human limitations—and one has only

to consider the problems that must repeatedly confront a hunted fox to realize the power of that instinct or faculty which keeps his mask steadily set towards the right quarter of the compass.

In connection with a fox's line there is a further interesting point, which, if not strictly a matter of orientation, is too closely associated with animal travel to be overlooked. It is a somewhat remarkable fact that the system of communication prevalent throughout the world is so comprehensive that there is not upon the map a town or hamlet to which access by road is unobtainable. The way may be difficult, but its existence goes without saying, nor does the four-footed world lack a similar system. Every district is served by an intricate maze of animal highways and byways, which, upon the same principle as human roads and footpaths, are used by the furred population, thus connecting every part of the country where wild life still exists. Wherever there is an animal to be found, it has its runways, and these, like the halts of birds, are utilized by any passing stranger. A dog, when crossing a hedgerow, does not break through at the first point which catches his eye. If watched, it will be seen that he almost invariably selects a rabbit-run, if the path of no larger animal is available, and a fox when making a long point seldom, unless upon open ground, quits the approved highways of his race, if these

lead at least approximately in the desired direction. Anyone with experience will know many such tracks, usually most noticeable across lanes or ravines, or passing from covert to covert. Failing "arterial roads", by means of which to attain his objective, the fox, after the manner of all travellers bound upon an imperative errand, avails himself of the best path possible. That any beast can find a path of some sort is certain, and it is on account of this circumstance that rare wild creatures when passing through a strange district fall victims to traps intended solely for residents.

It must be clearly emphasized that this great universal system of aerial and terrestrial travel, while facilitating progress, has no natural connection with orientation. For the definite furtherance of the latter end it serves no purpose, any more than fog constitutes a hindrance. Indeed, it has been stated that birds upon migration actually prefer misty weather since such conditions are seldom accompanied by high winds. Local birds engaged upon their everyday comings and goings dislike fog, however, as it destroys visibility and therefore constitutes a source of danger. They are confused by it, even as a human being would be under corresponding circumstances, because unable to locate the whereabouts of an enemy or to observe the movements of their own companions. At the sound of a shot, wild pigeons, for example, circle

in complete and panic-stricken bewilderment, being unable to trace the origin of the sound. They adopt precisely similar tactics when fired at from heavy cover, and for the same reason. Fog also confuses wide-ranging birds in a different manner. At the moment, they have no definite goal in view as is the case when they take wing from feeding ground or roost of their own free will. Under ordinary circumstances, when startled into sudden flight, they probably catch sight of some resting-place that suggests a haven where a change of plan can be considered. In this case, however, they see nothing but a grey, opaque curtain enclosing them upon every side. Having no destination in mind, the sense of direction is useless to them, and for the moment they are lost as completely as any "pixy-led" tyro of the human race. Such, doubtless, is the momentary mental state of the terrified plover or wildfowl that in blind mist circles repeatedly over the unseen gun.

Upon the other hand, fog presents no terror to the bird which has a definite goal in mind. Judging from personal experience wood-pigeons descend upon the familiar feeding-grounds in even greater numbers when the landscape is mist-enshrouded than when clear weather prevails, even though miles of blind country may intervene between the cultivated fields and their roosting-place. Their superabundance at these conventional feeding-grounds is significant since

it proves not only their ability to reach familiar fields, but the difficulty they experience in perceiving casual sources of supply which would otherwise have attracted a large percentage of the number. At such times, indeed, topographical knowledge is almost as indispensable to a bird as a sense of direction, since without the one little purpose would be served by the employment of the other.

Were the mental vision of a migratory bird capable of embracing anything beyond its immediate surroundings, the field of its imagination would be immense. For lack of knowledge which in all probability will never be available, one can only conjecture upon the avian geographical outlook. It is more or less generally supposed that species incapable of prolonged flight, when migrating, cross the Channel at the narrowest point, dispersing to their respective haunts after landing. The theory remains quite acceptable, being compatible both with reason and the comparatively local distribution of birds such as the nightingale, when one considers the stages that the broken journey involves. The route taken may be determined by research, but no system of study can reveal the processes by which the travellers become aware that the crossing point is reached. To follow a coast-line for hundreds of miles would tax neither brain nor instinct, but acute, indeed, must be the sense that indicates the necessity for the change

from overland to overseas travel. Briefly, what suggests the closer proximity of the opposite shore? Sight could only assist in extreme cases at most, and even were the aid of vision assumed, its use would necessitate anticipation—a deliberate watch for the dim line upon the far horizon denoting the country or continent of destination.

But the farther shore can seldom be visible when even the frailest bird commits itself to the venture, nor can it be supposed that the breeze brings any assurance of good things at no great distance away upon the other side, since by common assumption an off-shore wind is required with its promise of assisted passage before the migrants take wing. One is reduced at last to the bare admission that the birds must know both their direction and their geography, although the lesson is unlearned and no guides indicate the way.

Where no pronounced change of direction is involved, the proceeding is less incomprehensible. That birds should follow land as long as it plainly assists their course, taking to the sea when they can proceed no further by other routes, seems only natural, nor is it surprising, perhaps, that reluctant fliers should obey the migratory urge as long as it can be followed without ocean travel, or that they should come to a halt when the sea-board is reached, the impulse to proceed being insufficient to overcome the disinclination

to prolonged and arduous flight. Of this type the woodcock provides an example, the comparative abundance of this species upon the south-western coast-line being probably attributable to the intervention of the Channel, rather than to any special inducements offered by the Cornish woods and climate. It is possible, too, that many birds are vagrants rather than confirmed migrants, and are kept upon the move more by the force of circumstances than by inclination. Taking the woodcock again for an example, its desultory course through the country in early December can scarcely be considered as representative of the ordinary route observed by any species upon migration. As likely as not, that particular bird has already journeyed southward far enough to satisfy the migratory impulse, and, if unmolested, would probably be content to lead a quietly nomadic life in any suitable district. Subjected to constant disturbance, however, and debarred by instinct from gravitating northwards, it is at length driven to the coast which it reaches by no prescribed route. It may even then cross the Channel in the hope of finding the quietude that it seeks, although no longer under any imperative necessity to obey the migratory instinct.

It is perhaps doubtful whether any bird has a definite destination in mind when following the inclination of the autumnal movement. Presumably the journey ends when each indi-

vidual or species has found its requirements, but whether the objective is visualized before being realized is another matter. It has yet to be discovered, indeed, whether an autumnal migrant has any definite objective to attain. One assumes that the bird which winters in foreign lands has no overseas home, and that it leads the same life during the non-breeding period that is led by our own semi-migrant species that have no regular place of abode. Research has revealed a great deal as to the regions into which our birds penetrate, but it has yet to be discovered whether an individual ever spends the winter in the same locality twice.

It stands to reason that a fledgling when journeying southwards for the first time in advance of its parents can have no actual destination in mind, any more than the young eels, coming in from the ocean, can be capable of visualizing the fresh-water home for which they are bound, and one is perhaps justified in raising the question as to whether the mental attitude of a more experienced voyager is any more definite. The southward drift is actually the satisfaction of a need, subconsciously acknowledged, a matter, perhaps, of warmth attraction. As the summer heat recedes from the northern hemisphere, and with it the supply of food that warmth engenders, the bird instinctively realizes that conditions are no longer suitable to its manner of life, and automatically takes flight

to other lands that still offer the necessary amenities.

The object of the flight thus reduced to the simple, if unwitting, recognition of a need, it is not difficult to believe that the same instinct which suggested the need would assist its gratification by indicating the route to warmer latitudes. In actual practice migration may be comparatively simple. It may be nothing more than retiring before the chill wind—that same northerly autumnal breeze upon which may be heard the first faint footsteps of the advancing frost, the same wind that is supposed to impel the birds upon their way. That it should serve the dual purpose of messenger and carrier is only natural, and when aloft upon its ample wings, the little traveller may be guided to the nearest land by some simple form of earth magnetism, if one may use the expression in such a sense.

Migration might thus be defined as the purely natural pursuit of requirements. It is probably upon this account that many birds, upon reaching this country in the spring, proceed to their destinations by way of water-courses. These of necessity follow the valleys where spring-like conditions are more in evidence, the latter inevitably attracting the birds which in no way require any guide to direction.

One might even include the spring migration under the same category of necessity since the

birds which visit this island for the summer months come, it would seem, for one purpose only—the rearing of their broods. Presumably the summer heat is too great for the successful undertaking of so delicate a task, purely tropical species, of course, being outside the argument. The effect of excessive heat upon nestlings is apparent, and if the English sun at times proves over-strong, it is easy to picture what their case would be in a torrid climate. It may be assumed that migratory birds move northwards solely to breed—a contention strengthened by the fact that non-breeders, or unfertile birds, do not participate in the movement, but the spring influx differs from the autumnal ebb in that the migrant's goal is *definite*.

Were it not for the latter circumstance, the assertion that migration stands in a class apart from mere orientation would almost seem to be justified. Since the wanderer returns hundreds of miles to a selected spot, however, it is clear that the one embraces the most unchallengeable and remarkable illustration of the other. Actually, the operation of the direction sense recognized, the return of the breeder to its own nesting-place is not so extraordinary as might appear at first sight. All things are relative, and distance from a bird's point of view is a purely negligible consideration. Return does not seem remarkable in the case of the resident rook or raven, both of which wander far afield, and the

avian outlook, after all, is the same in each case.

As the breeding season approaches with its stirring emotional appeal, the bird becomes conscious of a need that its present surroundings cannot supply. Recollections awake of a distant place in which at some former time it experienced the full gratification of the desire that possesses it. It probably does not realize that satisfaction was found in surrender to the tender passions with the mingled joy and labour attendant upon a mate and family. Its one natural and irresistible impulse is to reach that spot, its whereabouts upon the map having nothing to do with the matter. The bird may be five miles away when the call comes ; it may be five hundred. The connection that suggested the place is enough. The operation of a sense, probably simple, but as yet mysterious because completely unknown to science, achieves the rest.

When grey skies prevail and wet weather sets in in September, the desire upon the part of a warmth-loving bird to quit our shores is not incomprehensible. Upon the other hand we now and again experience a summer or cycle of summers when the response of wild life to the approach of another season—as yet scarcely apparent even to the discriminating human susceptibilities—is both interesting and unaccountable. One would like to fathom the influences that disturb the tenor of a swallow's life when

conditions remain ideal, and summer "that was so fair and is so sweet" appears to be prolonging her stay indefinitely.

In the early autumn of 1933, for example, our English skies were far from grey, while even our usually stormy seas almost rivalled the Mediterranean in their tranquillity and depth of blue. Yet the prevailing conditions in no way affected the immemorial procedure of the birds, even though insect life was still abundant, so far as could be seen, while the night air remained far warmer than is often the case during July.

One cannot suppose that the swallows were conscious of the golden tints that diffused the woods—a premature symptom of autumn in somewhat curious contrast to the abnormally summer-like conditions—or that the harvest of berries had long been ripe. That the birds derived their information from a source more subtle than the changing colours of the landscape, may be taken for granted, and so imperative were the instructions of the infallible oracle, that they took their customary departure in defiance of a state of affairs under which, logically, one might have expected them to start rebuilding. Doubtless the very wind that was responsible for the clear skies, conveyed to the swallows the same message that it has borne for countless ages, and perhaps, too, the intuition of the bird originates in some degree from the shortening days, the haze that has crept into the

air, and the increasing chilliness and tenacity of the dew which the sun can no longer dispel.

Whatever the influences at work, the summons is as regular and imperative as the birds' response. Indeed, one might go so far as to say that in the case of a species so definitely migratory as the swallow, it is virtually impossible for the bird to overstay its appointed time of departure for any considerable period, and that the recorded instances of casual specimens that have been seen or found at odd seasons of the year, are purely accidental occurrences, due to some circumstance so abnormal that they have no value from a scientific point of view.

Conformity to approximate date—a factor which appears to be virtually inseparable from the actual arrival or departure of the majority of migrants—is one of the points most difficult to reconcile with any theory. One does not imply that all birds of a species take wing upon the same date. It is obvious that they do not. There seems to be reason for assuming, however, that each individual has its own time, according to its destination, its birthplace, and, probably, most important of all, the date upon which it was hatched. This, needless to say, may be upset to some extent by abnormal circumstances, but in general the rule prevails.

When the eminently mechanical nature of the entire proceeding is taken into account, it does not seem unreasonable to assume that a great

number of birds that are hatched in this country experience the first impulse to migrate upon attaining a certain point of maturity, second broods, as a matter of course, developing more rapidly by comparison, like late crops.

If these theories are correct, the earlier flights which, in the case of many species, are composed entirely of young birds, would consist of first broods and those hatched in early localities, all proceeding southwards in due rotation. When the same birds return the following season, their date of departure would probably depend upon their inherent impulse to reproduce, those which rear the latest broods being, presumably, themselves members of late hatchings in some previous year.

It seems extremely unlikely that any individual bird actually knows or recognizes an approximate date for quitting its own place, while the day itself must necessarily depend upon atmospheric conditions. That the impulse to migrate, like all other natural processes, should be more or less regular in its operation is only to be expected, however, when one remembers that a wild bird as nearly as possible observes a prescribed date upon which to lay its first egg. There is no cast-iron law in this latter respect, but it holds good for the most part, as anyone may establish by studying an individual pair year after year. The example of the raven whose dates were supplied in an earlier chapter will provide an illustration.

A bird with strong resident instincts, such as the carrier-pigeon, is somewhat differently placed from the migrant, although possessing and exercising the same faculty. So conservative is its disposition that it can rest content nowhere except upon ground it knows, and when released among unfamiliar surroundings, its one consideration is to return home with as little delay as possible. It may be confined at a distance for months, or even for a year or two, but original impressions are indelible, and sooner or later, if physically capable of doing so, it gravitates back to its own dove-cote.

In view of this pronounced characteristic of the domesticated pigeon, it is somewhat curious that the wild variety is not more strictly local in habit. Many species possess far stronger residential tendencies than the wood-pigeon, and it would be interesting to know whether a bird of such circumscribed range as a robin would return over a long distance to its own place. A partridge, though frequenting a scarcely more extensive area, almost certainly would not, and it is probable that a great many birds, unless naturally addicted to long flights, would adapt themselves to the circumstances in which they were placed, the homing instinct being insufficiently strong to inspire the necessary effort.

That birds should be greater travellers than beasts is inevitable. They have always the advantage of greater speed, being able in a few

hours to traverse distances which a beast could scarcely cover in as many days. The sphere of their activities, again, is not bounded by the sea which effectually stems the advance of four-footed creatures. It is mainly upon this account, perhaps, that migration upon a large scale is not habitual among the furred races, although it occurs overland in certain outstanding instances. Most noteworthy, though ancient history now, was the annual march, northwards and southwards, of the giant bison in the days when the shaggy ruminants roamed wild in countless thousands upon the plains of the North-West. There is nothing to-day to correspond with that stupendous ebb and flow of mighty four-footed life, although "local migration" is always in progress to some extent among various races of deer and other creatures that are constrained to change their quarters in search of food. For the most part, however, so far as the furred races are concerned, the hibernating instinct takes the place of the impulse to migrate, being in truth nothing more than a recognition of the same need in creatures to whom it applies.

Migration constitutes an incomparable example of natural economy, distributing the bird life of the world, according to the season, over those countries which are best adapted to maintain the avian population. It serves the further purpose of a vast winnowing system, eliminating in its automatic operation the weak and the old which

have become too decrepit to survive the rigid test of endurance. One wonders whether there is any truth in the story of the last and lonely journey which, according to old tradition, is undertaken by some of the larger birds and beasts away into the trackless wilds or out upon the desert seas at the approach of death. The burial-place of the elephants is probably mythical, and the whole idea has doubtless been romanticized, but there is no doubt that a great number of creatures forsake their customary haunts upon nearing the end. This point, however, is of only minor interest when compared with the great wonder of migration that has been operating before our eyes all down the ages, and is rendered only the more remarkable by the reflection that the solution of the problem is contained in the little animated bunch of feathers that constitutes a bird. And even more marvellous is the knowledge that the bird is in itself an irresponsible agent, a pawn, a unit, unconscious of the magnitude of its own achievement, each year embarking upon the great adventure without apparent demur or trepidation, until for one and all the day arrives when will exceeds ability, and the last long journey comes to an end upon "the shore no search has found".

CHAPTER XIII

VISION

THERE can be little doubt that the powers of vision possessed by beasts and birds constitute a question that revolves not so much upon extensive range and sharpness of definition as upon the animal's ability to comprehend or classify the visible. For the most part, there is every apparent reason for assuming that the wild creature regards the illimitable pageant of life and colour that surrounds it with eyes which, like those of a young child, "seeing see not", or, in other words, apprehend little of the universal phenomena apart from those features with which it is immediately concerned.

It is sufficiently obvious that in the case of beasts, vision by no means represents the sense upon which such animals mainly depend, either for purposes of self-preservation, or when in pursuit of their natural game. Or perhaps it would be more correct to suggest that of all its senses sight to the beast is least indispensable. A short-sighted animal would not be reduced to the same helpless position as that of one which lacked the use of nose or ear. Both in the domesticated and wild states one occasionally comes across animals

that have been deprived of sight by accident or illness. In such cases the formidable defect appears to restrict the normal activities of the animal to an extent far less than might naturally have been supposed. It is probable, of course, that the loss of one sense is accompanied by a corresponding accession of additional keenness in others, but this supposition does not satisfactorily dispose of the question.

According to old records, the scientist Spallanzi once made some revoltingly cruel but admittedly interesting experiments with bats which he blinded for the purpose. Quoting from one account :

“In spite of the mutilation, the unfortunate little creatures continued quite lively, and flew about as well as those which still retained their eyes ; they did not strike against the walls of the room or the objects in it, avoided a stick held up before them, and shewed a greater desire to keep out of the way of a cat or the hand of a man than to escape contact with inanimate objects.”

A later extract reads as follows :

“In a garden a sort of cage was prepared with nets, and from its top sixteen strings were allowed to hang down. Two bats were introduced into this enclosure, the one blinded, the other with its eyes perfect. Both flew about freely, never touching the strings with more than the tips of the wings. Finally the blind bat discovered that the meshes of the enclosing net were large enough for it to get through, and made its escape. . . . In a room containing numerous branches of trees or in which silk threads, stretched by small weights, were suspended

from the ceiling, the bats, though blinded, avoided all these obstacles."

It is worthy of remark that diurnal birds, when disturbed from their roosting-places at midnight, evince little difficulty in steering a course through the entanglement of branches that envelops them, while dogs, again, seem equally capable of hunting through the thickest cover in darkness or daylight. Defective light, indeed, affects the animal very little—the nocturnal activities of creatures that are largely diurnal, such as rabbits or deer, provide proof of this—and from the circumstance one must infer either that the eye of bird or beast more readily adapts itself to existing conditions than the human organ, or that the creature's movements are mainly regulated by other senses.

Upon the whole, birds would certainly seem to be keener-sighted than beasts. At the same time, it is clear that animal vision, whether among feathered or four-footed creatures, for the most part lacks the ability to discriminate, but whether this is primarily due to a defective sense or to limited imagination must remain a debatable point. However that may be, the normal animal, when guided by eye alone, seems curiously unable to distinguish between animate and inanimate objects, so long as they remain motionless. Upon numerous occasions, when sitting or standing perfectly still, as often as not in bold relief against an open background, one has under-

gone the minute inspection of wild creatures which seemed completely puzzled as to one's identity. Stoats, hares, badgers and even foxes have upon various occasions proved unable to distinguish a motionless human figure from a log or rock, though, needless to add, such experiments are only possible when the direction of the wind is favourable, one sniff being sufficient to warn the animal of its danger—real or imaginary.

When in doubt, or when unable to trust the testimony of its eyes, the wild beast has instant recourse to its sensitive nostrils, with which it flairs the breeze repeatedly. Scent undoubtedly constitutes its principal guide, and, failing the testimony of this infinitely delicate faculty, it looks for movement upon the part of the suspected object. Its complete inability to discriminate is further evidenced by the fact that any moving substance, as long as it is unfamiliar, proves equally alarming to a wild creature. A bird is quite as much scared by a fluttering ribbon or a paper windmill as by an active human enemy. A scarecrow that is useless upon a still day may become singularly effective—unless the birds are thoroughly accustomed to it—when a stiff breeze keeps its ragged extremities in perpetual motion.

The case of the conventional scarecrow—or rather, the attitude of the bird towards it—is sufficiently curious to warrant closer attention, since reasonable doubt might be expressed as to whether the grotesque representation of the

human form actually conveys to the avian mind any idea of resemblance. It is probable that the birds merely recognize an object foreign to the landscape, and constituting therefore a possible source of danger. The realization that it is inanimate, and consequently harmless, is doubtless eventually reached by processes that have no direct bearing upon conclusions drawn from visible points of difference.

The secret of the ease with which animal vision may be deceived probably lies in its inability to detect points of difference rather than resemblance. There is a subtle distinction between the state of being deluded by the accuracy of a representation and failure to detect its deficiencies. The former necessitates a critical even though ineffectual survey of the disguise ; the latter mere mental inability to perceive imperfection. Take, by way of example, the stereotyped stalking-horse frequently employed by sportsmen for the purpose of circumventing wildfowl. The most unsophisticated child would detect the imitation at a glance, yet it serves to outwit the wild birds of the shore, infinitely wary as they are, and keen to observe and interpret the slightest movement upon sea or land at all suggestive of danger from human or natural agency.

Yet here again there becomes apparent one of the many strange discrepancies which confront the student of Natural History at every turn. The unpractised eye of the human child instantly

comprehends the numerous points of distinction between the inanimate scarecrow and the human figure, between the stalking-horse and the living quadruped. The intensely vigilant bird, upon the other hand, is incapable of such discrimination, yet were the human and the avian vision submitted to a stringent test of actual capacity, which in its own natural sphere would prove the keener? Certainly no human eye could detect the movements of the grasshopper so clearly visible to the kestrel hovering sixty or seventy feet above ground. One can scarcely conceive the clarity of vision that enables rooks, though not even within sight of the agriculturist, to detect the surplus oats littered upon the newly sown field, or the thin and scarcely perceptible green hairs of the wheat when first thrust above the soil. So far as can be ascertained, neither rook nor wood-pigeon may be in the habit of passing within a mile of the enclosure in which its favourite crop has been planted, nor could the human vision detect any peculiarity that from a distance distinguishes the young blades of one crop from another, yet the moment it attains perfection from the bird's point of view, it is assailed by hungry flocks, appearing as if from nowhere.

In this connection one cannot overlook the grim case of the rapacious bird that detects the dead or dying animal from an almost incredible distance or height. The soaring vulture or raven may be nothing more than a scarcely visible

speck in the steel-blue dome of the sky, and one naturally imagines that in the vast field of vision that it commands, so inconspicuous an object as a carcass lying among the rocks or vegetation, with which its colouring assimilates perfectly, must be indiscernible. Yet the cold calculating eye of the robber bird, peering down from that vast height, not only distinguishes between the living and the dead, but between the healthy and the sickly, the active and the disabled ; the cogent reason being that it recognizes, through instinct or otherwise, the indications for which it maintains such sinister vigil.

An example of the wild creature's ability displayed in thus locating food, the presence of which it might scarcely be expected to discover, was recently provided by that most remarkable of our carnivorous birds, the raven. Speaking for the West Country, the inland range of this species is confined mainly to the Dartmoor area. It was the more interesting, therefore, upon visiting a district where ravens are little known, to notice three of these birds alternately circling over and alighting in a large meadow which appeared to offer some particular attraction.

Inevitable assumption that the ravens comprised a family party from some newly established eyrie in the vicinity was disproved by enquiry. There was no breeding-place within many miles of the locality in question. The ravens, however, had been about the field for a

day or two, feeding upon a number of newly docked lambs' tails that were littered about.

The presence of several lapwings and curlews in the field may or may not have been attributable to the same cause. From the observer's point of view the main interest centred in the question as to the means by which the ravens had first become aware of the feast provided. It seems scarcely reasonable to assume that so inconspicuous an object as a lamb's tail would be easily distinguishable, or would convey any definite impression to a bird passing overhead—perhaps fifty fathoms high in the blue. Was mere chance responsible for the discovery, one wonders? Did the activities of the other birds provide the clue, or was the knowledge obtained through the exercise of senses keener by far than sight or even intuition?

This incident, it should be remarked, was witnessed in early May, when raven families are seldom encountered at any considerable distance from their eyries. It may be inferred that the three birds were adults, drawn to the spot from as many different quarters of the compass by the common attraction. One is inclined to wonder, therefore, whether these grim patrols of the upper deeps observe the movements of one another from afar—a habit, correctly or otherwise, ascribed to vultures—and take independent action accordingly. Such behaviour would not be beyond the limits of avian psychology, but the suggestion in

this instance throws no light upon the channels through which the first bird makes the discovery.

The old controversy as to whether birds possess the sense of smell in the common interpretation of the word has lately been revived, some naturalists advancing the opinion that it is by means of this faculty that ghouls of the air are attracted to the carcass ten or twenty miles away. As a general rule, however, one would rather suggest that if any of the five recognized senses are actually employed, the answer to the riddle lies in the keenness of vision. By the employment of this remarkable faculty the ordinary bird seems capable of detecting literally anything that it expects to see.

Almost everyone at some time or other has experienced the difficulty of inducing even a keen-sensed human being to see or hear something with the appearance or sound of which he is unfamiliar. The difficulty ceases, however, as soon as the person concerned realizes the precise character of that for which he looks or listens. The same principle applies in the case of the bird which of all living things, perhaps, possesses the keenest eye, the latter being trained to detect certain minute objects upon earth or in air. Upon those occasions when one is inclined to think that a bird's vision has been deceived, or has failed to observe some comparatively conspicuous object, it is usually the mental and not the physical eye that has been unable to dis-

criminate. Little that is familiar can be invisible to a bird. In all avian affairs, apart from the sense of orientation upon a large scale, the eye constitutes the principal guide as surely as the nose directs the great majority of beasts when in doubt or difficulty, and a bird, if deprived of this essential sense, would be infinitely more helpless than a hunting mammal in a similar case.

There are, however, other and equally keen faculties which birds employ, the manner in which a thrush detects the whereabouts of a worm beneath the surface of the ground constituting a typical example. At first glance it would seem to be keenness of ear, although at times one is inclined to wonder whether it may not be rather another instance of that mysterious "sympathy", or "telepathy", which informs animals of the movements or whereabouts of other living creatures. Whether a bird exercises any actual intelligence or conscious discrimination in selecting a suitable field for its worm-hunting is another question.

Indeed, one is inclined to suggest that science is still very much in the dark as to many of the influences that govern avian actions. Not long ago, when carrying out some observations upon a remote Dartmoor hillside, a sudden rush of wings was heard overhead, produced by a long train of swallows sweeping up from the direction of the "In-Country", or lowlands of Devon. There was something eminently purposeful in the

swift determined rush of the little feathered company, and while still in view, its formation suddenly changed ; the headlong onwards course ceased as though at a word of command, giving place to a series of whirling evolutions, the flock deploying into a revolving cloud of birds, wheeling and flashing in every direction within a prescribed space, with the bewildering effect conveyed by a colony of ants or mosquitoes in motion.

Obviously the swallows had flown into a swarm of insects, and this, one could but assume, was the purpose for which they had crossed the hills. The problem as to whether these identical insects had constituted the objective—everything suggested that such was the case—and the means by which each bird had acquired the information far down in the lowlands, must remain insoluble, like many other instances of a similar character, until ornithology has advanced to a point considerably beyond its present stage.

All considered, one is brought almost inevitably to the following conclusion : That birds for the most part are endowed with penetrating vision is unquestionable, but the ability to discriminate is limited to situations and exigencies with which their mental faculties are incapable of dealing.

For instance, it seems unreasonable to assume that a bird when in full flight is unable to perceive so apparent an obstacle as wire netting or

a line of telegraph wires stretched full across its course. As often as not the obstruction is clearly silhouetted, either against the open sky or a dark background of greenery, yet the frequency with which winged passengers dash headlong against such barriers is nothing short of astonishing. Workmen employed upon the Southern Railway at a point where it traverses some high ground lying between Dartmoor and Exmoor obtain a regular supply of golden plover during the winter months. The birds, passing from one tract of moorland to another, often alight upon any suitable land that intervenes. Since they fly low in consequence, the wires alongside the railway line constitute a veritable death-trap that takes a heavy toll of the passing companies.

Rabbits display a similar inability to detect a net spread across a hole or runway. Whether the obstacle is conspicuous or the reverse, whether the net is constructed of bright-coloured twine or some texture that assimilates with the coarse grasses, matters little. The animal makes no apparent effort to avoid the obstruction which is obvious enough to a human eye thirty or forty yards away. In each case the explanation is simple. Wires and net, being entirely artificial products, do not figure in the mental vision of bird or beast as representing dangers against which to be prepared. Natural impediments they anticipate and avoid instinctively, but anything foreign to the wild landscape, unless suffi-

ciently opaque to obscure the view, is not recognized in the light of a menace.

Not long ago the question was seriously raised in sporting papers as to whether animals could see through glass. Here, again, it seems needless to remark, that their ability in this respect is obvious and unchallengeable, precisely resembling that of human beings. A bird that has found its way into a room or conservatory obtains an only too clear impression of the free world, access to which is debarred by the intervening panes. Into these it crashes with disastrous and often fatal consequences, if panic-stricken, although birds that are accustomed to passing in and out through a window, in time acquire sufficient understanding of the barrier to approach it cautiously, refraining from effort when they find the way barred. They also become tolerably apt at distinguishing between a closed and an open pane, although this is liable to become a matter of habit, and confusion occasionally ensues when the customary order is reversed.

Somewhat curious was the case of a young chaffinch, one of two that habitually fed at the window bird-table, and, happening to wander into the room, lost its head and its bearings at the entrance of the occupier. Mistaking a pane of glass for the opening by which it had entered, the inevitable crash ensued. The shock of the collision was not great, however, since the bird, being semi-tame, had not struck the glass with

much velocity. It fluttered down, then, recovering, made a circuit of the room, and returned to the window which had been opened wider during the interval. This was the obvious outlet, but the risk of another collision was not to be faced, and within an inch of the precise spot at which the previous crash had occurred, the bird halted in mid-air, with nothing but space before it, hovered for a few seconds, then, fearful of contact with the invisible barrier the removal of which it was unable to realize, it flew back into the room and alighted in a far corner.

Of the transparency of glass there can be no doubt whatever as far as a bird is concerned. When looking in at a window from outside the impression obtained is naturally less distinct, the reflection being as baffling to the avian as to the human eye, and in this connection some interesting points arise. Birds do not crash into every glass-covered aperture, but everyone must be familiar with some big window, or perhaps glazed door, which appears to possess a fatal attraction for the feathered race in general. There is a certain large bow window, fronting an extensive green valley in North Devon, which has probably caused destruction to as many birds as any other in the country. The casualty list is long and varied, but the principal victims have been partridges, the reason for the latter circumstance being found in the fact that the house is situated between two cultivated ridges full in the line of

flight taken by coveys crossing the intervening valley. The broad and concave surface of the glass, scintillating under the sun's rays, dazzles approaching birds and causes them to head straight for the light. Then, as close proximity dispels the allusion, they are confronted with the bewildering panorama of landscape mirrored upon the bright surface. Apparently bereft of all sense of locality or direction, they hurtle straight onwards—to catastrophe.

One may rest assured that were that window removed and replaced by an oil-painting of corresponding size faithfully depicting the scene that it confronts, not a bird would be deceived by the representation. Before it there would merely stretch a sheet of canvas as opaque as a brick wall, and it would be no more likely to crash into the one obstacle as the other.

Then why, one naturally wonders, is the avian eye so easily deceived by reflection, when the representation, equally realistic, conveys nothing to its conscious brain? Why is a bird—or, for that matter, a dog—attracted by its own reflection, even to the point of actual attack at times, when a life-sized painting of itself or another of its kind would arouse no interest? The answer surely lies once more in that magic quality *movement*. The reflection records every turn of the animal's own body, the stir of the leaves in the wind, everything indeed that suggests life and reality with sufficient vividness to deceive an

animal at first glance, although the more intelligent soon discover and seldom repeat the mistake.

Referring again to conventional beliefs, there is a curious idea, entertained even by intelligent people, that the eye of an animal, such as a horse or an elephant, possesses magnifying propensities. Otherwise, it is argued, these powerful animals would never submit to the domination of creatures so infinitely weaker than themselves as mankind. Under no circumstances, however, could so fantastic a supposition meet the case, for were animal vision indeed disposed to enlarge, the distortion would apply equally to all objects within view. Other beasts would assume the same magnified proportions, and the disparity in size between man and animal thus become equally apparent. Indeed, a brick would provide as effective a barrier as a wall, since the beast would obtain an altogether exaggerated impression of the obstacle that confronted it, and no horse could be prevailed upon to face even an insignificant jump in consequence.

Actually, the case amounts to nothing more than another example illustrating the complete absence of any comparative sense, and the complete ascendancy of mind over matter.

Naturalists of all time have been subject to a common failing. While in many instances much labour and thought have been expended upon an endeavour to establish the fictitious, questions

of real interest have frequently been overlooked. One point, especially in connection with animal vision, certainly invites closer attention. That beasts possess the faculty of perceiving alien bodies or substances that are invisible to the human eye is apparent to anyone who has closely studied animal behaviour. In dealing with this subject, however, numerous questions arise, and one hesitates to embark upon waters the depth of which as yet remains unsounded to all practical intents and purposes.

CHAPTER XIV

THE MIND OF THE WILD CRAFTSMAN

ALTHOUGH it may be safely assumed that animals recognize no high standards of art or craftsmanship, every wild creature might quite accurately be described as an artist, at least to the extent of being an adept at its own particular vocation. So rigid, indeed, is Nature's standard that the mere existence upon the earth of any creature guarantees proficiency in its own particular sphere.

Apart, however, from mere ability to fulfil the purposes of its existence, it may be observed that almost every creature excels in some accomplishment that is natural, though not necessarily essential to its way of life. Indeed, in this respect, Nature has distributed her gifts with remarkable impartiality, there being few animals that are incapable of inspiring admiration by the exercise of some faculty or craft. It would not be difficult to indicate an animal that is the very embodiment of grace and agility, another that is a past-master of swimming or burrowing, a bird whose aerial evolutions are beyond compare, while there are many varieties of beasts, birds and insects alike whose ingenuity

at nest-construction far excels the utmost that human or mechanical skill could accomplish.

It is only reasonable to assume that birds possess no sense of artistic effect, yet in its way the commonest nest of the hedgerow can scarcely fail to rank as a masterpiece of beauty. Art, indeed, is there, but the bird is no more the conscious artist than the brush in the painter's hand. Once again, it fills its part in an incomparably beautiful pageant, like the craftsman working out that portion of a design which has been allotted to him, the actual builder being as little responsible for the character of the structure as for the colour or markings of the eggs that it will contain. Indeed, in the bird itself and its eggs lie much of the attraction, since an empty nest, for all its delicate finish and inimitable workmanship, is like a flower without scent, a nut-shell without a kernel.

It is the wild bird's innate tendencies and predilections which make its selection of its eyrie both characteristic and picturesque. The fierce raven desires no other nursery for its brood than the mountainous crag or giant tree which constitutes its natural resting-place ; could conceive of no other bed for its eggs than the raw wool plucked from the sheep which it has devoured. The hawk could scarcely select building-site or material other than the branches of the trees above which it soars, while the colour scheme

of Nature, the keynote of which is harmony with setting, effects the rest.

From the structure and general style of a nest the character of the builder may be estimated with tolerable accuracy. All considered, it is not remarkable that each family and species should possess its own particular type of architecture, since the disposition of the bird and its general habits must naturally suggest both position and material, the use of which soon becomes compulsory by custom—the law of the wild. That design should be attributed to a great deal of the work that one sees is only natural upon the surface of things, since the method that underlies the effort is sufficiently apparent in the majority of instances. Also, when subjected to closer study, the blind, uncalculating instinct that compels the effort, without indicating its uselessness in many instances, is equally apparent. For example, the massive and elaborately prepared nest that the larger members of the *Corvidæ* deem essential for their purpose was doubtless a purely economical piece of craftsmanship in the first place, since it was designed to serve as a nursery over a period of years. For the purposes of the raven and the rook, the utility still prevails, but though the carrion crow and the magpie have for the most part relinquished the tendency to reoccupy an old nest, they bestow no less care upon the building of a structure that is destined to serve for one

season only. The carrion crow, for that matter, occasionally returns, but the proceeding is quite irregular, the bird's solitary disposition which is a trait usually conducive to—or the result of—a nomadic spirit, exercising an antagonistic influence upon its racial conservatism. In the case of the magpie, the rook's disposition to colonize may still be traced, for though scarcely gregarious, in localities where these birds are numerous several occupied nests may frequently be found in a favourite spinney, and so far as may be observed, there is no question of territorial rivalry.

An interesting example of instinctive economy in nest-building—almost attributable to deliberate calculation, were such compatible with other circumstances—is that of the wood-pigeon. Most prolific of the larger branch-builders, the wood-pigeon constructs the most shallow and temporary of nests, barely sufficient to support the weight of the growing young, yet almost invariably fulfilling the desired purpose, a new nest being provided for each fresh venture, so that sanitary requirements are also satisfied. The policy, indeed, is thoroughly practical from every point of view, but when one considers the infinite care that other birds of equal or superior intelligence bestow upon their structures destined for purposes as temporary, one must look to other causes than logic for the pigeon's frugal expenditure of labour and materials.

One can only suggest yet another natural provision, the prolific tendencies of the bird concerned allowing little time for nest-building. Its inclination to produce may conceivably supersede the instinct to build, while the hardy nature of the species demands no warm cradle for the young. The nest of the wood-pigeon is in truth eminently characteristic of the bird produced upon it, breezy, primitive, and as devoid of any suggestion of permanency as a casual gipsy-camp, yet picturesque in its very crudity and in the bold contrast of snow-white eggs with the dark tracery of twigs that supports them.

As a rule, a bird's work is attractive mainly because beautiful materials are at its disposal, and its inclination is inevitably in perfect keeping with the habitat from which it derives its nature. The whitethroat builds a fairy-like nest because it is in itself an ethereal creature, incapable of manipulating any materials save the light grasses which it utilizes in consequence. Standard is the product of environment, and thus it happens that the jackdaw, resident in a city tower, may construct its nest from scraps of wire in lieu of twigs, the slum sparrow with ends of string or thread ripped from rags, the bird having no thought of going farther afield to procure more decorative commodities.

There is always the problem of the "freak" builder, such as the kingfisher who can devise no more artistic bed for its beautiful eggs than

a mass of fish-bones, or the bower-bird who festoons her haunt with brightly coloured oddments collected from the vicinity of native huts or rubbish-heaps. One cannot attribute this latter habit to an appreciation of beauty, however, any more than the kingfisher's odd taste could be cited as evincing a lack of it. Each bird reveals a peculiar trait in its disposition, the action of the bower-bird being probably due to a "collective bent" and a fascination for bright objects akin to that of the magpie. The artistic sense could scarcely be reconciled with the strange assortment of bones and odd scraps that appeals to the bird's queer fancy, unless the standard of art is eminently progressive according to bower-bird lights.

The perfect technique and studied finish which characterize the majority of birds' nests are only consistent with everything produced in the normal course of Nature, where absolute uniformity and close attention to the most minute detail prevail as a matter of course. The formation of a nest might indeed be compared with the plumage or pelt of a living creature, or the coloration of a wild flower with which even "Solomon in all his glory" could not compete. It is not likely that the bird bestows more conscious deliberation upon the construction of its nest than the squirrel upon the growth of its bright little coat; than the plant upon the colour and fragrance of its blossoms. It may experience some doubt

as to the position of its building-site, but one can only repeat that the *character* of the nest, its pattern and construction are matters over which the bird exercises no control. The rigid uniformity of practice, compared with which any isolated exception is utterly negligible, precludes the slightest possibility of individual taste. Almost every nest is a picture of natural beauty for the cogent reason that if the laws which govern avian procedure are obeyed, any other result is impossible.

In operation this is more wonderful and more admirable than any human conception of the bird artist tastefully deciding upon the materials for its home, considering its colour scheme and selecting decorations and site according to its own idea of the picturesque. Not only would individual taste most surely differ upon fundamental points of architecture, but there is no reason for supposing that it would necessarily be good. Civilization provides sufficient examples of atrocity produced by cultured human fancy, and it does not seem reasonable to assume that the bird is so far superior to the human being in this respect that its artistic sense would never err. Upon its own initiative the bird could do little. Indeed, in its general habits, like all animals, it is a destroyer rather than a creator of beauty, and it only becomes capable of playing its part in that masterpiece of Nature by which avian reproduction is effected when its

actions are governed by influences beyond its comprehension.

The decorative finishing touch that certain birds give to their nests is almost as unaccountable as ornamental adjuncts to pelt or plumage. It were as easy to suggest a reason for the black tips to the ears of a hare as for the green lining—for lack of a better description—with which a buzzard adorns its completed nest. For this peculiarity there appears to be no satisfactory explanation. It is not a matter of employing the nearest material, being rather a deliberate act involving at times considerable effort and difficulty. Presumably the bird on pursuing this habit, merely obeys the urge of an instinct, the purpose of which is no longer apparent. The matter collected seems insufficient either to provide protection for eggs or young against the rough framework, or to aid incubation by fermentation. That the supply is replenished while the bird broods is improbable (unless upon chance occasions the cock, still under the influence of the building instinct, continues to bring contributions), the loose fragments upon the fringe of the nest being either displaced by the buzzard in its hasty departure, or remaining fresher upon account of having escaped the pressure of the bird's body. There is reason to believe that greenery is occasionally placed in an old nest before the female has decided whether to repair or to rebuild, but in this respect one

is liable to mistake fresh *growth* for material newly deposited. Tufts of pine-needles, roughly torn from their parent twigs, are commonly used, but occasionally grass is plucked for the purpose, and if roots or earth remain attached, fresh life springs from this source as the wood-work of the nest decays.

Apart from this peculiarity which seems to be general, few birds display as much individuality or better serve to illustrate many interesting points than the common buzzard. In most respects the nest conforms to rule, perforce, but in the matter of size the disparity revealed is remarkable. At times an entirely new structure is large enough to baffle any effort at inspection even when the site has been reached. Upon other occasions the erection is no bigger than the nest of the sparrow-hawk. These latter examples do not necessarily represent the work of young builders. There is no perceptible improvement in the work of a bird that returns to the same wood for a period of years, or, in a case recently noted, of two nests in the same tree. It is probable that certain individuals excel in the craft while others do not, a circumstance by no means peculiar to this species. There are sparrow-hawks that habitually utilize the nests of other birds, even as there are tawny owls that incubate in rabbit-holes. The cuckoo, it must be remembered, according to convention, does not select her victims indiscriminately, con-

fining her attentions to birds of the same race as her own foster-parents. Upon a corresponding principle, it is possible that a tendency to build heavily or lightly, like the partiality displayed for some particular species of tree, may run in the individual strain, each bird adopting that site which in general character most closely resembles its own earliest, if subconscious, impression of an eyrie. This theory would further serve to account for the discrepancies so often noted in the accounts of reliable observers from different localities. Two nests, built respectively in 1931 and 1932, within a hundred yards of one another, might have been identified as the work of the same builder by the almost precise similarity, not only of position, but of the trees chosen. These were oaks, the main trunk of each having a somewhat peculiar bend when nearing the summit, the topmost branches forming a strongly forked and decided crown which seemingly appealed to the taste of that particular buzzard. In the spring of 1933, though in evidence during March, the bird forsook the wood, but whether on account of inability to find a similar tree, or for some other reason, did not transpire. Another equally outstanding example occurred a few years ago upon the same estate. In this case, the approved position was a mighty crotch about mid-way between root and crown. The trees—again both oaks—stood deep in a large wood, the two eyries representing one

another to an extent that almost baffled distinction.

It is somewhat remarkable that a bird of prey seldom reoccupies a good site, at least in a tree. This, of course, occasionally happens in certain cases for several years in succession, but such instances can only be regarded as exceptions to the rule. Whether they may be looked upon as proof of especial desirability, or some peculiar disposition upon the bird's part, constitutes another question. Evidence rather points to the latter supposition. In one instance under notice—again that of a buzzard which for several seasons persisted in returning to a nest despite frequent molestation, even involving the loss of the young—the eyrie possessed neither the advantages of solitude nor inaccessibility. It seemed to be a case of either folly or indolence, and even in the latter event safer quarters might have been found without undue effort.

The alternative eyrie theory, or that of nesting places used in regular rotation, has obtained a measure of credence. It is one of many hard to establish or disprove. The principal difficulty lies in the number of years that must elapse before any observer can be in a position to make an authoritative statement. Unfortunately, few birds of prey stand much chance of surviving so protracted a period, while even if a nest is reoccupied after a lapse of two or three seasons, nobody can possibly assert that the bird which

takes possession is the original builder. Personally, I have found no evidence to prove that a bird ever makes use of a nest that it has not constructed but which belongs to one of its own species, although apart from apparent precedent, there is no valid reason for supposing that it is averse to doing so. It seems probable that more birds annex the nests of those of another race than is commonly supposed, one of the most remarkable instances being the recent fully authenticated case of a moorhen which appropriated the disused home of a magpie some ten feet above ground.

This apparent disinclination to annex the nest of one of its own species may be due to a tacitly recognized sense of property, or to the promptings of the same instinct that renders the more intelligent animals averse to cannibalism. However that may be, if a nursery is reoccupied by one of the same race, the bird is naturally regarded as the builder. In most cases, however, the occurrence is too irregular to suggest any method systematically pursued. Upon the contrary, it seems evident that no system is observed. The bird of prey merely obeys the impulses of its own restless spirit which is averse to regularity of habit, unless constrained by force of circumstances. Apparently, it soon wearies of any nesting-place, no matter how desirable, selecting another spot, perhaps miles away, and from every point of view less suitable. There are the

more conservative species, such as the eagle and the osprey, which remain faithful to selected areas for perhaps the greater part of their lives, but, speaking for the *raptores* as a whole, they evince little predilection for any fixed abode.

Incredible as it may seem, even the great shy birds, that have most cause to fear man and his activities, place desirability before safety when selecting a nesting-site. One would scarcely suggest that a bird when building studies the question of accessibility, being itself independent of such considerations as altitude or the facilities of ascent required by a human being. Its tendency to judge mankind from its own standpoint has already been demonstrated. Upon the other hand, one finds constant food for thought when noting the positions selected. It is noticeable that certain birds, of which the jay provides an example, evince a marked liking for trees that incline from the perpendicular, and in consequence are apt to discourage the would-be climber. That the practice also accentuates the difficulty is plain, the nest acquiring an inevitable tilt earthwards. To this, however, the bird appears to be indifferent, frequently returning to the tree, even though the actual position proves unsuitable for further use. It is compelled to build afresh, upon which account one may see two nests—the old and the new—within a foot or so of one another. Occasionally, when a particular crotch is considered desirable,

the builder adopts the simple course of removing an old nest which occupies the site, rather than using it as a foundation to a new structure—a sound policy in all walks of life.

Upon the whole, however, circumstances would seem to suggest that the possibility of danger from a human or natural enemy is seldom taken into account, mishap, when occurring, being treated as purely incidental—the fatalistic attitude generally prevalent in the wild. The bird, indeed, has no occasion deliberately to study safety when nest-building, since the instincts which direct its selection of site provide for that measure of protection which is essential, either by position or coloration. It is worthy of remark that a bird frequently shields its eggs from observation with its own plumage, those which nest upon the ground being usually the closest sitters and possessed of markings which harmonize perfectly with the herbage amongst which they brood. A notable exception to this rule is the lapwing whose plumage is eminently conspicuous. To counteract this defect, however, the peewit is the lightest of sitters, quitting her nest while danger is still distant, her eggs, instead, being of a colour which renders them almost invisible unless the eye falls directly upon them.

Ground-breeding species can scarcely be described as builders, however, since, with exceptions, little effort is made at nest-preparation. As often as not there is no apparent attempt

at camouflage or even secrecy, the one obvious consideration being the discovery of a dry spot upon which it can incubate with comparative comfort.

The fact that birds of the game and wading varieties are usually sparse builders is significant, since in illustrating the operation of two instincts it further helps to demonstrate the predominance of inherent rule as opposed to voluntary action in natural architecture. The ground bird experiences no desire to build, in the first place because a nest is unnecessary since the chicks leave it as soon as hatched, while in the second case, the nest if made in those open places where snipe and plover breed, would constitute a source of danger, for the structure could scarcely fail to be conspicuous. Other species, such as meadow-pipits, the young of which remain in the nest until fledged, provide more comfortable nurseries—a circumstance that serves to prove that the comfort of the young is the primary motive responsible for nest-building. In brief, where no nest is necessary, none is made, and the need of each species is provided for by rule, little being left to the discretion of the individual. By way of exception, the kestrel, to give one example, may lay her eggs either in a nest or upon a bare ledge. This bird, however, lacks the building instinct, the nest which she utilizes being that of some other species. One may assume, therefore, that her young are of the

hardy type and independent of minor comforts. Another instance is that of the tawny owl already mentioned, a bird that may either appropriate an old magpie's nest, or, dispensing with luxury altogether, make shift with a hollow crotch or a rabbit-hole. It is difficult to reconcile such diametrically opposite standards of requirements, which once again one can only attribute to inherent tendencies, or the effect of circumstance upon habit.

Nest-building animals differ from birds in one important respect. While birds build from no other motive than to provide a nursery, many beasts are compelled to construct a permanent home or winter dormitory, which must necessarily be of a more durable character. Most hibernating creatures also provide nurseries. There are others which make nests for breeding purposes only, and since these are usually burrowing animals, their undisturbed work is seldom exposed to the daylight. One of the best examples is the nesting-burrow of the rabbit, a little work of art for which the constructor seldom receives full credit, her talent being effectually concealed beneath the earth. Indeed, surprisingly few people recognize a nest-builder in the rabbit, although few creatures manufacture a neater or more elaborate structure, and certainly none hide their work with greater skill and purpose.

The period during which young rabbits are

dependent upon their mother is remarkably brief, yet, comparatively speaking, no other species makes such laborious preparation for the expected family. Not content with the numerous burrows available, the little animal usually gives itself the trouble of digging a new one for the occasion, excavating the small cavity usually known as a "stop". This takes the form of a shallow passage, some three or four feet long, enlarged at the far end where the nest is placed. These quarters are occupied by the young only, the parent lying elsewhere, always closing the entrance when leaving with earth so finely smoothed that even an expert eye finds difficulty in detecting its whereabouts.

The value of concealment is sufficiently obvious. More interesting is the instinct to avoid main burrows where the young would at least have been safe, not only from human interference, but from the tireless activities of badgers and foxes. Many litters, of course, are born within the depths of the main strongholds, special little compartments being excavated for the purpose and subsequently utilized as "seats" by adult rabbits. It is these *cul-de-sacs* that they frequently refuse to vacate when attacked by ferrets. Smaller places are always preferred, however, and one can only assume either that the rabbit fears its own kind or that it recognizes the desirability of fresh ground and untainted herbage for the young when they are

first able to nibble. This would account for the practice of making "stops" in open pasture fields, fresh tillage or even flower-beds. There is also the possibility that the animal anticipates greater security from privacy, the common haunts of its race being more liable to attack from its arch enemy the stoat. Upon the other hand, the danger from birds of prey is far greater in the open, and since there exist even in this island many winged marauders by whom a young rabbit is accounted both fair and easy game, it seems obvious that the solution cannot lie in that direction.

It is curious that animals destined to spend their lives upon the ground should require an elaborate nest during the first two or three weeks of their existence. Neither the fox-cub nor the far more delicate leveret know an equivalent luxury, although the latter animal lies exposed to all the vicissitudes of the weather. How the young rabbits escape suffocation in the limited space allowed them is further matter for conjecture, since their need of air when underground is frequently manifested later in life. Presumably, for this reason they would not survive the prolonged absence of the parent, by which provision the danger of slow starvation if orphaned during the helpless stage would be minimized. It is noticeable that when they have attained a certain growth the entrance to the "stop" is unblocked, but there are no means of ascertain-

ing the mental processes by which the mother recognizes the necessity for ventilation or the precise stage at which it becomes desirable.

The "form" or "kennel" that an animal makes for itself under green cover cannot perhaps be regarded as the result of craftsmanship, since the creature does little other than insinuate its body into the necessary position amongst the herbage; its own weight and contour being sufficient to achieve the rest. Anyone who has watched a domesticated animal ensconce itself in deep bedding can have little doubt as to the procedure adopted. A "form" once made is regarded in the light of a definite construction, however, being occupied more or less regularly, as one might utilize an outdoor erection such as a summer-house. The only British mammal that actually builds a shelter for itself upon the ground is the hedgehog, a genuine master of camouflage, its little structure harmonizing so perfectly with its surroundings that it is rarely detected except by accident.

The appearance of a hedgehog's "wigwam" suggests that the animal must adopt the primitive though somewhat difficult course of wrapping itself in dry grass, blanket-wise, and still encased in this covering, burrowing like a mole into the dry leaves which, resettling naturally above the spot, disguise it so effectually. Once buried, the hedgehog would soon wriggle its canopy into the correct dimensions, and when

emerging, it merely slips from its case as a hand from a glove. The problem of re-entry might well tax the ingenuity of any other creature, but this would appear to be one of the hedgehog's special lines of efficiency, and the general character of his shelter does not suggest frequent disarrangement.

It is an outstanding feature of almost any natural provision that the achievement of one purpose usually effects another. The hedgehog being an eminently warmth-loving creature, burrows under the leaf-drifts mainly for comfort, yet in the process conceals himself more perfectly than could be accomplished by the most studied craft. As often as not, that same artistic finishing touch with which the wild creature completes his work, supplies the identical splashes of colour that constitute the most effective disguise. Even the buzzard's green larch-tops would go far to blind the structure from above, serving to break the mass of dark sticks which would otherwise catch the eye of a passing egg-thief. One does not suggest this as a reason for the habit, although the effect is unquestionable, and the practice consistent with the general procedure of Nature.

There is no creature that better combines the artistic touch with charming natural guile than the dormouse, one of the tiniest, but most accomplished, of English branch-builders. The nest in which this little beast may be found is by

no means inconspicuous, particularly when placed in some deciduous bush which affords no screen during the winter months. At such times, even if noticed, it is frequently mistaken for the old nest of some bird, and disregarded in consequence, few people troubling to inspect a structure the derelict nature of which is taken for granted.

Actually, the home of the dormouse resembles no other nest, excepting, perhaps, that of the gold-crest, when suspended like the latter from the extremity of a fir-bough. It is constructed of almost any available material, and may also be found in the centre of a low bush, particularly the hazel, but probably the greater number of nests designed for permanent quarters are placed in gorse. The reason for this is obvious, the prickly evergreen providing both warmth and protection. It is also possible that in early summer, before the season of the nuts and the berries, the gorse seeds afford an acceptable diet.

The nest in which the young are born is probably a temporary affair, built solely for that purpose. It is somewhat loosely constructed of moss and leaves, unlined, and more spacious than the snug little dormitory in which the adult animal sleeps, being about the size and shape of a coco-nut. The craft of the builder is displayed in the use, or rather in the disposition of dry leaves in its fabric. By means of these, the builder has improved upon the long-tailed tit's ingenious device of closing its entrance with

a feather, the dormouse providing himself with a pliable swing-door that opens or closes automatically as required. They also serve as an effective disguise, and there is yet one more purpose, eminently characteristic of the minute, fairy-like creature that builds so romantic an abode.

When an investigating hand is placed upon the nursery of *Myoxus avellanarius*, or when the branch which supports it vibrates at the intruder's touch, one witnesses a curious optical illusion. The impression received is that of dry leaves detaching themselves imperceptibly from the fabric of the nest and drifting earthwards to mingle with the fallen assortment from which they are indistinguishable. A casual glance follows their descent, not without wonder that so light a touch should have dislodged them.

Then the eye rests upon a leaf whose fall has been arrested by an intervening twig, and the deception is exposed, for, clinging to its unsubstantial support and regarding the gigantic intruder with black, inquisitive, but still sleepy eyes, is no leaf, but a dainty living animal, exquisite in its protective colouring of russet and chestnut, almost as ethereal as the inanimate objects which it features so perfectly. Too late now, one scans the ground for the "leaves" that fell. They have vanished like raindrops in dry earth, and yet another lesson has been learned, another example provided of the deep

but unconscious guile practised by the eminently guileless.

The dormouse, incidentally, is an adept at other and lighter accomplishments. He is as much at home among the branches as his near relative the squirrel, whose acrobatic skill he even in one sense excels, having acquired the opossum-like trick of suspending himself from a branch by means of his tail, which mobile and slightly bushy member curls round a hazel-twigg as tenaciously as a honeysuckle tendril. He can also support himself, like a monkey, by clinging with one of his four feet or "hands", and one might almost say that an adult "seven-sleeper" is incapable of an accidental fall. Nor has he any occasion to fear such a contingency, for even when a tiny mouse who has not yet acquired his tree-legs loses his hold and drops to the ground, his feather-weight body appears to sustain no injury, and at times, indeed, when desperately anxious to seek and take cover in Mother Earth, he voluntarily adopts this method of descent as the most speedy means of effecting his purpose.

Returning to the topic of more serious arts and crafts, it is tolerably certain that an animal adapts its nest to a chosen site rather than selects a position to suit the type of structure that it desires to build. In operation the effect is much the same, since, assuming that every creature builds a nest upon the lines of that in which

it was reared, the situation that it bears in mind would be suitable for the support of such a nest and no other. Presumably, too, the ability to build a pensile structure or one supported from the base would "run in families", like many other tendencies. Whether an individual would be capable of producing work answering to either of the above descriptions is a point somewhat difficult to determine. Specialists in one or other department seem to be the rule, however, and the task of identifying an animal may often be assisted by studying the character of its work, for while all of a species proceed upon a common basis, individual idiosyncrasies and variations in technique upon a minor scale are inevitable.

It may be taken for granted that anticipation of future need is experienced by all animals in whose case such necessity is reasonably likely to occur, or may be expected in the normal course of events. At the same time it is difficult to imagine an animal such as the squirrel working to fortify its dormitory against cold or rain while early autumn days are mellow and the woods, still gay "with the hues of summer's rainbow", as yet impart no hint of thinning foliage or falling temperature.

For that matter, it is doubtful whether any creature deliberately provides itself with a *winter* bed. As the grass stiffens with the first suspicion of frost in the lengthening nights, the little beast curled up in its inadequately protected dormitory

awakes and shivers. It emerges chilly with the white dawn, and before another sun has set bestows some attention upon its over-ventilated sleeping-quarters, fills up interstices and provides itself with an additional warm blanket of dried grass or moss. As the need increases it further strengthens its fortifications, a cold autumn, therefore, leaving hibernating animals well prepared for anything that may follow. If, upon the contrary, abnormally mild weather persists, nest-building animals are liable to neglect necessary precautions, and when the thermometer falls to a proportionate extent, creatures that have gone to sleep with a covering that seemed more than ample under the prevailing conditions discover that the provision made was all-insufficient.

If the animal is old or weakly, it may never awake. If in good condition when it went to sleep, it emerges from its bed which is little better than a refrigerator and wanders through the chill woods in search of the food that has disappeared. In the most bitter weather squirrels and hedgehogs, both of which should be snugly asleep, may be encountered in the most unexpected places, bold with the weakness of hunger and at a loss how best to proceed among conditions with which they are unfamiliar.

The instinct to build a winter home is not so strong as that which prompts the construction of the spring nursery, although the need of the individual animal would appear to be greater.

Presumably an adult is better able to cope with the results of any miscalculation than helpless nestlings, and negligence of any sort need not therefore be attended with the same disastrous consequences. In any case, beasts for the most part are less skilful craftsmen than birds, although in many respects far better equipped for the work. The squirrel, for example, should be under no necessity to appropriate the discarded nest of a magpie—a trick ascribed to the species but not verified by personal experience. True, considerable economy of labour and material might be effected by this means, but since these are considerations that seldom occur to the animal mind, one would suggest that it is the site which constitutes the attraction, and that the squirrel merely adds its own work to that of the magpie. There are not many occasions, indeed, upon which the nest of a bird would serve the purpose of a squirrel who usually prefers to build in an evergreen shrub when this is available rather than in a high tree, partly, no doubt, with a view to shelter, partly for better concealment. He is particularly fond of a holly or a dwarf spruce, and may even choose an ancient gorse-bush. He constructs a nest large enough to accommodate him comfortably, and so far as personal observation serves, no larger. This, indeed, is characteristic of the four-footed artisan who, as a rule, seems to possess a tolerably shrewd idea of his own

requirements, and adapts his labour to the actual needs of the moment. The beast differs from the bird in being to a large extent an independent builder and less accomplished in consequence.

If the bird is more skilful, however, or more elaborate in its work, the beast is certainly the most industrious in its general habits. There is no feathered creature as assiduous as the mole or the rabbit, the latter being one of the most indefatigable of excavators, though its labours pertain to the undesirable. The badger, though a stolid worker, relaxes effort when his aim is achieved, the greatest or most purposeful industry being displayed, perhaps, by the smaller mammals which are busily employed collecting and storing winter supplies while other creatures merely feast.

This instinct to hoard, though more strongly developed in certain species of rodents which have no other source of supply during the winter months, is more or less general, particularly in the canine family whose habit of carrying off oddments with intent to bury them is probably the origin of the retrieving art. The bird which needs "neither store-house nor barn" since it can migrate to a land of greater abundance when times become hard, buries no treasure, although a disposition to store is evinced by certain species, such as the shrikes, and up to a certain point, the crow family, although the

latter are rather inclined to collect articles other than food.

Nature is prodigal of labour, and those of her children that either gather or produce, frequently accumulate a larger supply than they are capable of consuming. Thus the hamster or the vole hoards in excess of its needs ; the bird expends unnecessary care upon the nest which, utilized for a few weeks, survives the storms of almost as many years, while the bee community toils to manufacture an immense supply of honey, only a minor portion of which it will or could consume. This is usually the case with animals whose sole guide is instinct, and the greater their numbers the more perfect as a rule is their workmanship.

When regarding an elaborate piece of mass handiwork, such as a beaver-dam or even a wasps' nest, one is impressed, not so much at the perfection of the completed task, as by the evidence of the harmony that must have existed among the creatures engaged upon it. The Tower of Babel was abandoned, owing to the difficulty that the builders experienced in making their respective ideas intelligible to one another, yet a quantity of beasts or insects that can speak no language and possess, one assumes, no ideas to communicate, achieve a task of no inconsiderable magnitude without, it would seem, the least divergence from the common purpose or the slightest doubt as to the correct method of

procedure at any critical juncture. How, one wonders, do beavers decide upon the precise position of each log, or wasps the contour and size of the nest, and the stage at which to start decreasing? Beavers might conceivably assist one another at felling trees by the mere force of example. It would be only necessary for one animal to commence operations to ensure assistance, even as one elephant might aid another in the uprooting of a tree upon which it had designs. It is in the manipulation of the more responsible undertakings that workmanship in perfect accord is displayed in so unaccountable a degree. Can it be that every wild creature attains automatically such a standard of excellence in its own particular line of craft that there can be but one method of dealing with each situation as it arises, but one way of performing a task, but one opinion as to the correct manner of completing it? A skilful card-player in certain situations has no doubt as to the precise identity of the pasteboard slip that partner or opponent must place upon the table. No alternative course is possible, and it may well be that the animal, working by inexorable rule, is similarly placed.

In that case, it might almost be asserted that the animal is not a conscious agent in any work that is prompted by habit or natural impulse. That, perhaps, is too sweeping an assertion, yet blind force and genius run upon lines so closely

parallel that distinction is not always easy to trace. It was Henry Fielding who declared that "beasts of the field and fowls of the air work not for themselves". That is probably true, but the extent to which the animal controls its own volition or is responsible for its own achievements is a problem the depth of which must remain unplumbed.

•

CHAPTER XV

LIMITATIONS

IN no sphere of animal activity are mental limitations more strikingly demonstrated than in the complete absence of any mechanical or arithmetical sense. By dint of laborious training, a bird or beast may be induced to repeat certain automatic processes, while now and again a creature more supple-witted than the average of its kind may master the principle of some simple mechanical device. Instances might be cited from personal experience of cattle which no ordinary gate fastening could confine, and of more than one cat that upon its own initiative discovered the secret of unlatching a door. These, like skilful hunting tricks, are further examples of ability developing from observation and experiment. Usually, however, no animal is either physically or intellectually capable of manipulating the simplest instrument or even of plain deduction, that is to say, when the circumstances are outside the scope of its customary experience. A dog unquestionably understands the principle of shooting. It knows a gun well enough. It also realizes—mainly from association but partly, also, from inherited instinct—

the significance of a shot. If allowed to do so, however, it would seek dead game quite as assiduously were the weapon discharged at a paper target. It might get discouraged in course of time, were the proceeding constantly repeated, but it would remain none the wiser as to the true cause of its repeated disappointment. Again, a dog certainly realizes that the gun is responsible for the fall of the game, but, even could it be taught to discharge the weapon, the most clever animal that ever lived could not be brought to master the simple principle of aim. It would apprehend no danger were the gun levelled at itself, and entertain no theories as to the reasons for unsuccessful shooting.

With regard to mathematics, it is only necessary to consider the constantly recurring controversy as to whether a wild bird is or is not capable of simple numerical calculation. Reduced to a direct issue, the answer is an equally plain and emphatic negative. The animal's inability to "count" in the literal and general interpretation of the expression is beyond doubt, but the circumstance in no way establishes either the stupidity or the incomplete mental structure of the creature concerned. It lacks the mathematical bent for the simple reason that arithmetic plays no part in its life and outlook. A first-class wireless set is not considered an imperfect instrument on account of its incapacity to fulfil the purpose of a gramophone. Each device

specializes in its own particular function, and upon a similar principle the mental eye of the bird or beast operates through different channels from those by means of which human conclusions are reached.

It is tolerably certain that even the most intelligent animal cannot add two single figures after the manner of mankind, and this circumstance is rendered the more curious by the fact that simple addition or subtraction is seldom beyond the capacity of a mentally deficient human being. At the same time it must be remembered that almost any wild creature is capable of performing, without the slightest mental effort, feats of distinction or discrimination that would tax the ingenuity of human mathematicians to the uttermost. The wide-ranging bird, after cruising for hours above the vast pine-forest or featureless prairie, experiences no difficulty in steering a direct course to that particular tree or grassy tussock which for the time being represents its own niche in the illimitable Universe. Yet when viewed from a distance or a height, either forest trees or tufts of grass are as similar as the backs of cards. One has only to imagine the corresponding state of affairs from a human standpoint—an immense city, composed of precisely similar buildings, arranged without streets, numbers, or any distinguishing feature. To identify one erection from another would constitute a task beyond

human power, and life under such conditions would amount to mere chaos. In the everyday affairs of existence, even in the return to his own home, man must work by system, by numbers, by visible indication and calculation, or—for it amounts to little else—by arithmetic. The wild creature knows nothing of such things, but no bird has ever yet failed to recognize its own tree, or has alighted unwittingly upon any nest other than its own, even though the site may be surrounded by thousands of other trees or bushes from which it differs in no visible respect. One might endeavour to account for it as merely providing yet another instance of “sense of direction”, which expression is one of the most comprehensive in Natural History. It is none the less perfectly apparent that no matter what instinct constitutes the guiding force, that precise nest and locality figures in the mind’s eye of the bird. It serves as its conscious objective without which even the wonderful sense of orientation would prove of little value.

Possessed of such a faculty, no bird needs to employ any human method of calculation reached by means of figures. It is equally certain, however, that in many circumstances which require the exercise of a purely human arithmetical process, the bird would be helpless. It is more or less generally supposed that animals recognize the difference between one and more than one. It has already been stated that the normal bird

will submit without desertion to the removal from the nest of all its eggs save two. Under no circumstances, however, will it tolerate any further reduction. It will never continue to incubate a single egg except upon the rare occasions when the original clutch has consisted of no more—and it is worthy of note that in the case of birds such as wood-pigeons who lay two eggs only, the removal of one is almost invariably followed by desertion.

From these circumstances it is sufficiently clear that the bird realizes the incompleteness of its clutch when the latter is reduced to a single egg, but whether the conclusion is reached by calculation is quite another question. It seems equally inconceivable that the realization of loss is forced upon the bird by senses that are purely physical. With a few isolated exceptions, the minimum clutch that Nature permits for the reproduction of bird life consists of two eggs. This represents the utmost limit that suffices to sustain the incubating instinct. If further reduced, the sole remaining egg fails to satisfy. Desire to incubate is lost, and the bird forsakes its task, either to start afresh, or to abandon the effort until another season as the circumstances of the particular case may determine.

Young birds are protected from any risk of desertion by the parental instinct, which, quickened in the mother as hatching time draws near, proves even more powerful and self-sacri-

ficing than the fundamental instinct to incubate. Nestlings are seldom, if ever, abandoned, no matter how rapidly their numbers may dwindle, the case of the cuckoo-usurped nest providing sufficiently apt illustration.

In the opinion of some observers, gregarious creatures, if not in the habit of keeping an actual census of their numbers, at least recognize loss. When a covey of partridges has been dispersed by any sudden alarm, the birds reassemble as quickly as possible, one or more of the number calling incessantly until all the survivors have come in. From this it does not seem unreasonable to assume, that partridges to some extent keep a record of their numbers, the more so since the rally-call appears to cease as soon as the muster is complete. Upon the other hand, it may be observed that the rally note is usually uttered in response to the call of stragglers who wish to rejoin the covey. When no further plea for guidance vibrates from the surrounding fields, the leader of the covey—usually the old hen who originally mothered the brood, and now assumes principal rôle from force of habit—also relapses into silence automatically. The rally note, therefore, must not be regarded as a roll-call, but merely as a response. It is not probable that numerical decrease would be recognized by survivors unless sufficiently pronounced to affect the general conduct of the little community. A covey that originally consisted of twenty, if reduced to

two or three, would probably realize to some extent its depleted state. Its survivors would lack the confidence that numbers impart, and its general behaviour would be somewhat different in consequence.

The same principle applies to the attitude that birds adopt towards their dependent young. Nothing could exceed the solicitude that a mother grouse evinces for the safety of a chick that, detached from its fellows, pipes its distress from among the heather. Were that chick unable to announce its solitary state, however, the mother would bestow no thought upon the missing member of her family, or even be aware of its absence. The majority of birds would be vaguely conscious of something lacking to the customary state of affairs were the brood suddenly and substantially reduced. Were the depletion effected gradually, however, it is doubtful whether any sense of loss would be experienced.

It has already been noted that recognized relationship has no existence in wild life, ceasing automatically as the young birds pass from the dependent state, and this circumstance is rendered the more remarkable by the fact that during the brief period of family life, the ability to distinguish relative from alien is astonishing.

For proof of the latter ability it is only necessary to observe the behaviour of a brood of young swallows a-row upon a roof-top, awaiting the return of the mother bird with family sup-

plies. The air around them may be literally alive with other swallows darting about in every direction, but the movements of these birds arouses no apparent interest in the little band of hope, each member of which sits chirping plaintively, every sense alert for the first glimpse of the one figure that represents the gratification of all its physical desires. To the human eye, in the main, as we have seen, infinitely more discriminating, there is nothing to distinguish that one mother swallow from fifty others, but the observer who watches the young birds carefully will notice a curious thing. Suddenly, and for no apparent reason, an electric current seems to pass through the expectant fledglings. The note of patient despondency is changed for one of eager anticipation. Every wing is raised, every gape opened wide as each percher stands erect, but even so, some seconds may elapse before the old bird, whose distant approach has so obviously been perceived, detaches herself from the indiscriminate, hurrying company of her kin, and assumes a distinct identity by heading for the roof-top.

The method that the mother bird adopts in the actual feeding of her young is worthy of study, providing a singularly characteristic illustration of avian psychology. When the expectant row consists of five fledglings, she begins, as a rule, at one end of the line. The first young one receives the food that she has brought, and

upon her return with a further supply, the second in the row is served, then in his turn, perhaps, the third. One is filled with admiration at the systematic character of the proceeding, but the impression is no sooner formed than shattered. Upon the mother's return for the fourth time, the fledgling which by right of turn is obviously entitled to attention, for no perceptible reason is overlooked. The food is bestowed upon perhaps the fifth, or the first or second of the row, and so it goes on, one or two of the young birds—presumably the louder voiced—receiving more than their apparent share at the cost of their less vociferous fellows. In all probability the disparity is eventually rectified, since the more noisy, when sated, might be expected to relapse into silence, leaving the less adequately supplied members to urge their claims unopposed. Since the more vociferous are probably the more lusty, however, it is equally likely that they contrive to secure the larger share, particularly if the food supply, together with the parent's patience and perseverance, is not inexhaustible, and this may be one of the reasons why a certain number of nestlings fail to "make good". It is also possible that the position, from an observer's point of view, may be somewhat complicated at times by the activities of both parents working in conjunction and each pursuing his or her own line. The general effect is by no means altered upon this

account, however, since any system or method, if pursued by either bird, could scarcely fail to be apparent in its operation.

However that may be, each young bird as a rule ultimately obtains sufficient for his needs of the moment, so far as can be seen, but this is only procured by persistent assertion of his claim. Obviously, there is no established law of division in avian family life.

One may rest assured that no member of a brood is regarded in the light of an individual, nor in the event of loss would be mourned as such by the parents. The same general principle applies to the units which compose a flock or herd. Among gregarious beasts each animal to some extent recognizes another with which it is familiar, while the presence of a stranger in the midst is immediately detected. When a number of small herds combine for any common purpose, animals which know one another usually hold more or less together, but there are no social *cliques* or friendships. An absentee would be neither personally missed nor sought by its former fellows, any more than the loss of a coin or two from a handful of uncounted coppers would be noticed by the owner.

Such being the case, the belief, not infrequently entertained, that animals take numerical stock of human enemies seems a trifle fantastic. Wild ducks exhaust the patience of a fowler by studiously avoiding the neighbourhood of the points

at which the guns are placed. Theoretically, in such case they have seen the enemy take cover, and, being well aware of his presence, hold aloof until the danger takes visible and unmistakable departure. It is claimed, however, that the birds may be outwitted by leaving one or two of the party in ambush. The ducks, being incapable of subtraction, are supposed to be deluded into the belief that the coast is clear, and return to their disturbed haunts with disastrous consequences. Some sportsmen, I believe, go so far as to engage men to accompany them to the "blinds" for no other purpose than to execute an obvious retreat as soon as the fowlers have taken up their positions. The birds, scared into flight at the first approach of the entire party, are said to watch the exit of the non-combatants with satisfaction, and under the impression that everyone has gone, return the sooner.

If the ducks are indeed watching from afar and awaiting an opportunity to come back when they can do so with safety, there is no logical reason why the stratagem should not prove effective. Upon the other hand, there is room for doubt whether wildfowl would actually adopt such tactics, since in all probability, if driven away in the first instance, they would have removed for a while to some distant resting-place from which the movements of the sportsmen would be indiscernible. One is justi-

fied in wondering how large a part coincidence—the stock argument of the sceptic—has played upon those occasions when the stratagem has seemingly proved successful. In the first instance, one needs to be convinced of any direct connection between the departure of the fowlers and the return of the birds. The latter event might conceivably have taken place in precisely the same way had every man exercised some further patience and remained at his post a little longer, or if no artifice had been employed. Success is frequently achieved without the aid of guile, and it is only reasonable to assume that the mental attitude of the birds in this respect would be the same under all circumstances. If upon one occasion they awaited the visible departure of an enemy that had disturbed them before again venturing into any prescribed area, they would not be likely to neglect the precaution another time.

Were the truth realized, there is every reason for assuming that the question as to whether an enemy is actually approaching or departing rarely figures in the calculations of a bird. The *proximity* of the supposed danger is the only point with which the avian mind appears to be concerned. A receding enemy causes quite as much alarm as one who is directly approaching. As often as not, a brooding bird, like the rabbit in its form, allows the intruder to *pass* before stirring, then, when in reality safe from

detection, takes flight. Of this peculiar feature of animal mentality one sees numerous examples, but the most noteworthy, perhaps, is that afforded by the raven, of all birds the most intelligent when judged from a human standpoint.

According to this bird's point of view, nobody may pass within a prescribed distance of the eyrie, or any place where the newly fledged young are resting, without constituting a menace. The direction that the assumed enemy is taking matters not at all. The mere fact of his having committed a trespass upon the guarded area is sufficient. One has frequently been escorted half a mile or so upon the way by a hoarsely vociferating raven, although heading directly *away* from the eyrie. The lapwing, the curlew, the whimbrel and numerous other birds observe similar tactics. The secret of such apparently pointless and foolish behaviour lies in that same avian inability to discriminate, and there is no justification for supposing that wildfowl upon the shore would prove themselves more logical. The appearance of enemies, whether coming or going, would have a purely disturbing effect rendering the birds shy of the neighbourhood for a considerable while, and it is more than probable that the sportsman hinders, rather than furthers, his own cause by adopting unnecessarily ostentatious methods. His end, in all likelihood, would be better served by taking up his position with as

little display as possible. In any case those birds which have seen him will not readily return whether he feigns retirement from the scene or otherwise, any that appear to have been deceived being newcomers that neither saw him arrive, nor his representatives depart.

Upon the big game-reserves in other and newly exploited parts of the world the modern naturalist at times finds it convenient to pursue his observations in the close proximity of a motor-car, to which he retires when some obstreperous buffalo or rhinoceros evinces active resentment at the disturbance of its privacy. As an almost invariable rule the car serves as an effectual disappearing-box within which he is usually safe from attack. The fact that the metal structure contains the man of whom he was in pursuit rarely seems to occur to the mighty beast, nor does it adopt the obvious expedient—simple enough to a rhinoceros—of battering the car to pieces. The actual disappearance is sufficient, the amount of space that conceals the object concerned being beside the point. There is little distinction in the mind of bird or beast between a few square yards of metal or wood work and infinity. This attitude, moreover, is eminently consistent with animal behaviour in general. The most wary creature displays very little fear of any man-made structure that offers no definite evidence of human occupation. In the stillness of sunrise the wildest animal approaches the inhabited house, the cara-

van, or the hurdle-hut in the fields with perfect confidence, and one must not suppose for a moment that either the game bird or the wild brooding mother is deceived by the artificial "blind" employed by sportsman or photographer. The secret of man's success lies in his ability to efface himself rather than in the perfection of his camouflage.

It should also be remembered that the wild animal's conclusions as to danger or safety are reached by other means and through other channels than those suggested by human logic. The wild duck sees safety, not so much in the visible departure of an enemy, as in the lonely silent shore and the peaceful attitude of other winged creatures. When the gulls rest contentedly along the water's edge, when the cormorant pursues his fishing within fifty yards of the beach, and the crow or jackdaw hunts for crustaceans undisturbed, he is convinced that all is well. The danger that is not visible has no existence in his scheme of things, and when the unseen gun roars from behind the pile of seaweed or fringe of heather, he is just as unpleasantly surprised as though the same thing had not happened a hundred times before in the course of his adventurous and precarious career.

Not long ago I watched the feigned-departure trick employed against a brooding carrion crow whose portrait was desired by a Nature-photographer. As a test of the avian capacity for arith-

metic, the case might be regarded as a proof of anything, according to the point of view that one wishes to establish, but from a purely psychological aspect it has its interest. The nest had been built near to the ground in a lonely little tree beside a Dartmoor stream, and so closely did the occupier adhere to her post that her presence was neither declared nor suspected until a hand was almost placed upon the nest. The position rendered a "close-up" of the bird when actually sitting impossible. It was decided, therefore, to await her return and attempt a snapshot as she again took wing, putting her to the trouble of a second flight for the purpose.

The party numbered three, of whom two made an exit, leaving the photographer ensconced in some tall ling which commanded a view of the nest. He should have been invisible, and, conventionally, the bird should have been satisfied. Such, however, was far from being the case. A survey of the position undertaken some five minutes later convinced her that both she and her nest remained under observation, and at last, reluctant further to impede her duties, the watcher vacated the field. Whether or not the crow witnessed his departure one cannot say. She was nowhere in sight upon a barren and empty landscape, but however that may have been, upon returning to the place after a short interval, she was found to be again in possession. This time, however, she proved to be less accom-

modating, taking once more to flight when the photographer was still fifty yards away from the nest.

Her action in this latter respect constituted perhaps the most interesting feature of the proceeding, being so completely at variance with her previous behaviour. Possibly she recognized the individual whose persistence had already caused her such annoyance, although she had previously allowed him to approach within a yard of her before taking wing. If so, it amounted to a clear case of identifying an enemy—according to her lights. It is more probable, however, that her elusiveness upon this second occasion was due to the fact that she was still disturbed in her mind, and had not yet relapsed into the torpid state of the heavily brooding bird. The case is open to almost any interpretation one cares to put upon it.

It is perhaps superfluous to add that the conduct of a crow under such circumstances cannot be regarded as representative of bird behaviour generally. A brooding hawk or falcon, for example, if driven from her nest, will return after a short lapse of time without apparent thought for a concealed watcher. Such a contingency does not seem to figure in her calculations. Again, upon the same day that witnessed the crow experiment just described, I saw similar tactics employed upon a ring-ouzel with a diametrically opposite result. In this latter instance

two of the party withdrew, leaving one observer posted upon a rock in plain view. The ring-ouzel lost no time in returning to her task, and would probably have acted in the same manner had the entire party remained in sight. Her mental view of the situation in no way resembled that of the crow, owing doubtless to the entirely different character of the bird and their respective relations with mankind.

One is justified in wondering whether a wild creature is capable at any time of *identifying* a human being, even were the person concerned habitually dressed in scarlet or any outstanding colour. The feathered inhabitants of a garden appear to extend the same confidence to strangers that they display towards those by whom they are daily fed, while even domesticated animals will approach anyone who enters their enclosure at feeding-time. All comers appear to be regarded alike as long as customary procedure is observed. The bird is concerned with circumstance rather than individual appearance. Wood-pigeons, if unmolested, will fearlessly alight and even nest in garden trees, but when afield take startled flight from the owner of that garden, no matter how often they have seen him at close quarters. The example of the sea-bird and its curiously different attitude to the human figure upon the lonely shore from that displayed upon the crowded beach has already been given. Man, indeed, seems to be regarded as a species that

may prove either friendly or hostile, not so much according to identity as to setting.

The question as to whether animals in either their physical or mental outlook recognize racial distinctions between human beings is an interesting one. In cosmopolitan lands it would almost seem at times that the negro is regarded as a creature apart from the white settler who has proved himself a neighbour of a very different and infinitely more formidable character. It has been stated that the larger carnivores will never prey upon a white man if a negro is available—that a white hunter, sleeping in the open, may rest in perfect security if attended by natives of the country. For this two reasons have been assigned. It is assumed in the first instance that the beast prefers the coloured victim as being more essentially its prey, while another theory suggests that the alleged partiality for the negro displayed by lion or leopard may be due to realization upon the animal's part that the coloured man, being usually unequipped with firearms, proves safer game.

The connection between the white man and the rifle may or may not be perceptible to the beast, but, however that may be, the apparently deliberate selection of the native by a lion in search of food may conceivably be due to another cause. Negroes, being far more numerous than white men in lion-haunted countries, naturally fall more frequent victims, as in the famous Tsavo

case, when the camp contained one European only. Were the conditions reversed, it is scarcely probable that a man-eating carnivore would deliberately select a single negro from a number of white men. Upon the contrary one may assume with tolerable certainty that it is mainly a matter of opportunity, and that a human being of any description would serve the purpose of a confirmed man-eater.

Incidentally, there is reason for doubting whether man is the *natural* game of any wild beast. A visitor from Kenya recently told me that, speaking for an extensive area with which he is familiar, while lions and leopards are comparatively numerous, a man-eater is virtually unknown in the district. Unless directly provoked, the big *felidæ* are regarded even amongst the native population as dangerous to cattle only. One may go so far as to assert that in any part of the world, the conventional "man-eater" is an abnormal product, and any natural predilection for natives of the country, much less deliberate discrimination, is improbable. It must be remembered that Kipling in his *Jungle Book* describes man as prey-forbidden to rapacious beasts by jungle law in view of inevitable reprisals. The wild creature's ability to anticipate future retaliation upon the part of man would involve, however, the exercise of deliberate calculation scarcely within the range of animal psychology.

The immediate effect of an act is doubtless

apparent to the more intelligent bird or beast, but it is equally certain that the animal mind is not concerned with the possibility of indirect reprisals. A lion might conceivably possess sufficient perspicacity to realize that attack upon a sportsman would immediately be countered by a bullet, but it would hardly trace the connection between a midnight raid executed upon a camp and an expedition organized for its destruction a few days later. By way of more homely example, a dog that has been bitten by a snake and suffered serious illness from after effects, certainly shuns a reptile of the same species in future. This fear, however, would be engendered by recollection of the sharp pain that accompanied the actual bite rather than the subsequent distress.

An animal would not connect the after effects of a wound with the direct cause, any more than it would recognize the source of a disease contracted through infection, and in its inability to anticipate trouble it is spared not only a large share of actual apprehension, but also much anguish of mind and anxious thought for the future, this being part of the price paid by man for the privilege of superior intellect.

Julius Cæsar evinced no great perspicacity when expressing wonder that "men should fear". It is true that the "necessary end will come when it will come", but an inherent desire upon the part of human beings to defer that end as long as possible, renders fear the most natural

emotion in the world. In this respect, again, the animal, like the valiant, has an advantage, since being devoid of imagination, it "tastes of death but once".

There is yet another point to be considered in this connection. Everything is relative, and those whose lives are constantly exposed to peril must inevitably develop an indifference to danger that is quite unknown to pursuers of an entirely peaceable existence. One lion at large in any part of great Britain would cause more consternation than the entire carnivorae of Africa to the inhabitants of that continent, and it is only logical to assume that the wild creature by whose side Death always walks apprehends the closer approach of the grim shadow very little in consequence.

There was portrayed in an old novel a well-drawn character who seldom failed to trace the motives that prompted some unaccountable action upon the part of an acquaintance by the simple expedient of putting himself, metaphorically, in the other man's place. When judging human conduct this is doubtless the best course that could be adopted. When endeavouring to fathom the working of an animal's mind, it is certainly the worst, unless one could at the same time assume the nature of the beast or bird, and with it enter the mysterious world in which it lives and moves and has its being.

Much will doubtless be discovered that is yet

unknown concerning the relation of brain to intellect, but the actual mental activities of the wild creature, its impressions and thoughts, if such are formulated, can never be ascertained, unless the "dumb" creature acquires other definite means of expressing ideas and emotions.

Upon all questions of real import connected with animal psychology there appears to be but one answer, supplied by Kipling to another insoluble problem :

"That no one knows—that no one knows—
and no one ever will."

And, after all, who shall say that it is not better so, for is not the most interesting problem that which baffles solution? The mentality of the wild creature would lose much of its fascination were its utmost limitations, like the physical processes through which it derives its existence, exposed to the cold light of Science. Truth may, indeed, be stranger than fiction, but mystery is more alluring.

BY DOUGLAS GORDON

DARTMOOR IN ALL ITS MOODS

‘It would be hard to overpraise this charming and illuminating book. It would be a mistake to go to Dartmoor without it, and it is enjoyable reading even if you never go to Dartmoor.’—*Observer*.

‘The book that every Dartmoor visitor will buy and treasure.’—*Sunday Times*.

‘Full of intimate and first-hand observation, and contains much information about the customs and superstitions, both curious and uncanny, of the Dartmoor folk. The descriptions of scenery are vivid and sympathetic.’—*Discovery*.

‘Mr. Gordon’s aim was to present a characteristic picture of Dartmoor in every setting. He has succeeded admirably. His book breathes refreshingly the true spirit of the Moor: brings back vividly its scent-laden air. Indeed there is no book we know to which we can now turn with such joy even after a day on the Moor itself.’—*Western Morning News*.

‘His book is that mixture of information and diversion which, handled by a pen with personality, means acceptable human companionship.’—*Daily Telegraph*.

With 8 half-tones, four being from water-colours by Lord Gorell.

Cheap Edition. 6s. net.

BY DOUGLAS GORDON

FIELD PHILOSOPHY

‘A rich admixture of anecdote, much of it amusing and new. A first-rate book for the gun-room table, for the subjects are exactly those which continually crop up whenever sportsmen congregate.’—*The Times*.

‘A pleasantly humoured and particularly fair-minded book. His arguments in support of the position are certainly worth attention.’—*The Field*.

‘I cordially recommend it to all my readers. His volume is packed with practical hints.’—*The Morning Post*.

‘Mr. Gordon has written a charming and wise book. His chapters are among the best on these subjects that have been written, full of common sense and clear thinking.’—*Illustrated Sporting and Dramatic News*.

‘Extremely good. This book is worth keeping: its illustrations by Miss Frances Pitt are as good as one would expect photographs by that fine naturalist to be.’—*Sunday Times*.

‘Should be read by all. Mr. Gordon writes with genuine feeling of appreciation of birds and animals.’—*Sunday Referee*.

With 8 Illustrations, 7 by Frances Pitt.

Cheap Edition. 5s. net.

NATURE'S QUEST

By FRANCES, COUNTESS OF WARWICK

Decorated by RICHARD B. OGLE

Many curious and interesting problems and puzzles are discussed in this delightful book. Lady Warwick makes the world of nature immensely fascinating and, by winning the reader's interest, leads him to understand many of Nature's strange and unaccountable paradoxes.

7s. 6d. net.

MY GARDEN DIARY

By MAUDE HAWORTH-BOOTH

With a Preface by WILLIAM ROBINSON

A delightful book for garden lovers and garden makers, intended to show how to make the garden a series of lovely pictures following one another, with the borders a rhythm of colour from spring to autumn. With 21 Illustrations and a Chart.

7s. 6d. net.

THE OWNER-GARDENER

By SIR EDWARD ANSON, BART.

This is essentially a text-book for those who are responsible for the management of a garden without the benefit of skilled assistance. No effort has been spared to explain as clearly as possible the fundamental principles of good gardening, and incidentally it contains information which may well be of use to the skilled amateur and even to the professional gardener. With Plans in Text.

7s. 6d. net.

IDLINGS IN ARCADIA.

By E. D. CUMING. A delightful book by the collaborators who produced the delicious "The Arcadian Calendar." With 10 full-page line and 12 half-tone Illustrations by J. A. Shepherd. 10s. 6d. net.

WILD LIFE AT THE LAND'S END.

By J. C. TREGARTHEN. Records and Observations of the Habits and Haunts of the Fox, Badger, Otter, Seal, etc., and of their Pursuers in Cornwall. "Has all the charm of the best conversation of a sportsman of the old school, mingled with that of a gamekeeper and a poacher." Daily Chronicle. Second Impression. Illustrated. 7s. 6d. net.

THE STORY OF A HARE.

By J. C. TREGARTHEN. "With patience and sympathy he has been able to build up a coherent biography of a singularly elusive creature which few naturalists know. Altogether admirable." Nature. 3rd Impression. Illustrated. 6s. net.

THE LIFE STORY OF A BADGER.

By J. C. TREGARTHEN. "The charm with which the tale is told will appeal to all. Mr. Tregarthen has the happy gift of imagination; but his artistic sense never allows his fancy to beguile him into the invention of sensational incidents without foundation in fact." Field. 2nd Impression. 6s. net.

THE LIFE STORY OF AN OTTER.

By J. C. TREGARTHEN. "The book is one in which naturalists will especially rejoice, because they will find what cannot be found elsewhere. . . . This speaking description of Western scenery and graphic tale of the most mysterious of its denizens." Times. 3rd Impression. Illustrated. 6s. net.

THE WILD SPORTS AND NATURAL HISTORY OF THE HIGHLANDS.

By CHARLES ST. JOHN. With Author's Notes. Memoir by the Rev. M. G. Watkins. Tenth Impression. Illus. 6s. net.

CHALK STREAMS AND WATER MEADOWS.

By E. A. BARTON, with a Prefatory Letter by G. E. M. SKUES. "There are very few writers who possess that indefinable charm which can carry one away to the real angler's country. Dr. Barton is one of them." *The Field*. Illustrated by 12 Photographs by the Author. 7s. 6d. net.

FIELD PHILOSOPHY.

By DOUGLAS GORDON. "I cordially commend it to all my readers. Packed with practical hints." *Morning Post*. Illustrated. Cheap Edition. 5s. net.

DARTMOOR IN ALL ITS MOODS.

By DOUGLAS GORDON. "Packed with interest; everyone who knows Dartmoor will find his knowledge quickened and sweetened by it." *The Times*. With 8 Illustrations, 4 being from Water-colours by Lord Gorell. Cheap Edition. 6s. net.

A COTSWOLD VILLAGE.

By J. ARTHUR GIBBS. Portrait of the Author and other Illustrations. "It has been a real pleasure to read it." *The Guardian*. Eleventh Impression. Illustrated. 7s. 6d. net.

LETTERS TO A SALMON FISHER'S SONS.

By A. H. CHAYTOR. "We are glad to welcome a new edition of one of the best practical books on salmon fishing that has ever been written." *The Field*. Third, Revised, Edition, with an Appendix, Diagrams and Illustrations. 9s. net.

FISHING AND SHOOTING.

By SYDNEY BUXTON. Illustrated by Archibald Thorburn. "Lucid and charming. We have not often read a book on fishing with greater interest." *Field*. Fourth (Cheap) Edition. 5s. net.

PARTRIDGE DRIVING.

By CHARLES E. A. ALINGTON. Some practical hints on increasing and preserving a stock of birds and on bringing them over the guns. Second Edition. With Diagrams. 6s. net.

THE GROUSE IN HEALTH AND IN DISEASE.

Edited by A. S. LESLIE, assisted by A. E. SHIPLEY, F.R.S. "Full of very valuable information, both to the Sportsman and the Scientist." *Field*. Illustrated. 15s. net.

BIRD LIFE AND BIRD LORE.

By R. BOSWORTH SMITH. "Mr. R. Bosworth Smith has dealt with a fascinating subject in a fascinating manner." Daily Telegraph. Illustrated. 6s. net.

THE HERON OF CASTLE CREEK AND OTHER SKETCHES OF BIRD LIFE.

By ALFRED W. REES. With a Memoir of the Author by J. K. Hudson. "It will be treasured by many a nature lover, and its usefulness will not end with one generation." Liverpool Post. With Portrait. 3s. 6d. net.

THE STUDY OF ANIMAL LIFE.

By SIR J. ARTHUR THOMSON, M.A., LL.D. "Abounds in information set forth in an easy way. The array of facts is remarkable." Nature. New, Revised, Edition. Illus. 6s. net.

THE GAMEKEEPER AT HOME ; or, SKETCHES OF NATURAL HISTORY AND RURAL LIFE.

By RICHARD JEFFERIES. "Delightful sketches. The lover of the country can hardly fail to be fascinated." Saturday Review. 18th Impression. Illustrated. 6s. net.

THE AMATEUR POACHER.

By RICHARD JEFFERIES. "We have rarely met with so much that is entertaining, combined with matter of real practical worth." The Graphic. 13th Impression. 6s. net.

ROUND ABOUT A GREAT ESTATE.

By RICHARD JEFFERIES. A fascinating account of life in country villages as it used to be. 6th Impression. 6s. net.

WILD LIFE IN A SOUTHERN COUNTY.

By RICHARD JEFFERIES. "Marvellous pictures of country sights in England. A volume to be read and re-read." The Graphic. Twelfth Impression. 6s. net.

DOG BREAKING.

By General W. N. HUTCHINSON. The most expeditious, certain and easy method. With odds and ends for those who love the dog and gun. Popular Edition. Illustrated. 7s. 6d. net.

POCKET EDITION ON THIN PAPER OF THE WORKS OF
ARTHUR CONAN DOYLE

First 18 Volumes. Cloth, 3s. 6d. net ; Leather, 5s. net each.

ADVENTURES OF SHERLOCK HOLMES. Keenest thrills and mysteries *de luxe*.

MEMOIRS OF SHERLOCK HOLMES. Thousands of his admirers will revel in these memoirs of the famous sleuth.

THE RETURN OF SHERLOCK HOLMES. Again is Sherlock Holmes triumphant !

HIS LAST BOW. Some reminiscences of Sherlock Holmes. ' They are of the first vintage, sparkling, rich and very palatable.'—*Daily Graphic*.

THE VALLEY OF FEAR. ' One of the most fascinating stories unravelled by Holmes.'—*Daily Graphic*.

THE HOUND OF THE BASKERVILLES.—A Curse, a Mystery ; at last the solution by Sherlock Holmes.

THE SIGN OF FOUR. Who murdered Sholto ? Sherlock Holmes was roused to solve that problem—and solved it.

THE WHITE COMPANY. What of the men ? The men were bred in England : The bowmen—the yeomen—the lads of dale and fell.

SIR NIGEL. A prelude to ' The White Company,' wherein the gallant Sir Nigel wins his spurs and his lady.

EXPLOITS OF BRIGADIER GERARD. Intrepid, witty and always gay is the hero of these amazing exploits.

ADVENTURES OF GERARD. With sword, imagination and wit, he served Romance—and the reader—well.

RODNEY STONE. A gallant, stirring story of sport and sportsmen in olden times.

MICAH CLARKE. A moving romance of the Monmouth Rising—of stirring gallantry and of proved appeal.

THE TRAGEDY OF THE ' KOROSKO.'

THE REFUGEES.

TALES OF THE RING AND CAMP.

TALES OF PIRATES AND BLUE WATER.

TALES OF ADVENTURE AND MEDICAL LIFE.

The Conan Doyle Omnibus Volumes

The Complete Sherlock Holmes Short Stories

ADVENTURES. MEMOIRS. RETURN. HIS LAST BOW. THE CASE BOOK. Five Volumes in One. 1348 pp. 7s. 6d. net.

The Sherlock Holmes Long Stories

A STUDY IN SCARLET. THE SIGN OF FOUR. THE HOUND OF THE BASKERVILLES. THE VALLEY OF FEAR. Four Volumes in One. 7s. 6d. net.

The Conan Doyle Stories

THE RING AND THE CAMP. TERROR AND MYSTERY. PIRATES AND BLUE WATER. TALES OF LONG AGO. TWILIGHT AND THE UNSEEN. ADVENTURE AND MEDICAL LIFE. Six Volumes in One. 1216 pages. 7s. 6d. net.

The Conan Doyle Historical Romances : Vol. I

THE WHITE COMPANY. SIR NIGEL. MICAH CLARKE. THE REFUGEES. Four Volumes in One. 1644 pp. 7s. 6d. net.

The Conan Doyle Historical Romances : Vol. II

RODNEY STONE. UNCLE BERNAC. ADVENTURES OF GERARD. EXPLOITS OF BRIGADIER GERARD. Four Volumes in One. 828 pages. 7s. 6d. net.

SHERLOCK HOLMES : FACT OR FICTION ?

By THOMAS S. BLAKENEY. Second Impression 2s. 6d. net.

"This is a fascinating little book that ought to be read by everyone interested in the literature of crime and detection."—*Yorkshire Post*.

CHARLOTTE BRONTË and her SISTERS EMILY and ANNE BRONTË



LADY RITCHIE, Thackeray's daughter, once said that no more spontaneous honour was ever offered by one woman of genius to another than when Mrs. Gaskell wrote the 'Life' of her friend Charlotte Brontë. It is one of the great biographies in the English language, and can never be superseded.

HAWORTH POCKET EDITION ON THIN PAPER, in Seven Volumes. With Introductions by Mrs. HUMPHRY WARD. F'cap 8vo. Bound in Brown. Cloth, 3s. 6d. net ; Leather, 5s. net each. Cloth Case to contain the seven volumes, 5s. net.

1. JANE EYRE. By CHARLOTTE BRONTË.
2. SHIRLEY. By CHARLOTTE BRONTË.
3. VILLETTE. By CHARLOTTE BRONTË.
4. THE PROFESSOR. By CHARLOTTE BRONTË.—POEMS by CHARLOTTE, EMILY, ANNE and PATRICK BRONTË.
5. WUTHERING HEIGHTS. By EMILY BRONTË.—AGNES GREY. By ANNE BRONTË. With a Preface and Biographical Notice of both Authors by CHARLOTTE BRONTË.
6. THE TENANT OF WILDFELL HALL. By ANNE BRONTË.
7. THE LIFE OF CHARLOTTE BRONTË. By Mrs. GASKELL. Introduction and Notes by CLEMENT K. SHORTER.

POEMS: Selections from the Poetry of Charlotte, Emily, Anne and Branwell Brontë. Including some Poems hitherto unprinted. Edited by ARTHUR C. BENSON. With Portraits of the Sisters and two Facsimile MSS. F'cap 8vo. 3s. 6d. net.

STANLEY J. WEYMAN



IT appears to have been the success that attended his first novel, 'The House of the Wolf,' that encouraged its author, Mr. Stanley J. Weyman, to plan a story on more generous lines. In 'The House of the Wolf,' it is of interest to note, the character and conduct of the Vidame de Beziers find a parallel in one of the most remarkable incidents in the Massacre of St. Bartholomew.

POCKET EDITION ON THIN PAPER, in Twenty-four Volumes. Arranged Chronologically. With an Introduction in Volume One by the Author. F'cap 8vo. Bound in Red. Cloth, 3s. 6d. net ; Leather, 5s. net each. Cloth Case to contain the 24 volumes, 7s. 6d. net.

1. THE HOUSE OF THE WOLF.
2. THE NEW RECTOR.
3. THE STORY OF FRANCIS CLUDDE.
4. A GENTLEMAN OF FRANCE.
5. THE MAN IN BLACK.
6. UNDER THE RED ROBE.
7. MY LADY ROTH.
8. MEMOIRS OF A MINISTER OF FRANCE.
9. THE RED COCKADE.
10. SHREWSBURY.
11. THE CASTLE INN.
12. SOPHIA.
13. COUNT HANNIBAL.
14. IN KINGS' BYWAYS.
15. THE LONG NIGHT.
16. THE ABBESS OF VLAYE.
17. STARVECROW FARM.
18. CHIPPINGE.
19. LAID UP IN LAVENDER.
20. THE WILD GEESE.
21. THE GREAT HOUSE.
22. OVINGTON'S BANK.
23. QUEEN'S FOLLY.
24. THE LIVELY PEGGY.

BOOKS ON
NATURAL HISTORY
AND
COUNTRY LORE

Published by
JOHN MURRAY, Albemarle St., LONDON, W. 1

By J. C. TREGARTHEN

WILD LIFE AT THE LAND'S END

Records and Observations of the Habits and Haunts of the Fox, Badger, Otter, Seal, etc., and of their Pursuers in Cornwall. 'Has all the charm of the best conversation, of a sportsman of the old school, mingled with that of a gamekeeper and a poacher.' *News Chronicle*. Second Impression. Illustrated. 7s. 6d. net

THE STORY OF A HARE

'With patience and sympathy he has been able to build up a coherent biography of a singularly elusive creature which few naturalists know. It is altogether admirable.' *Nature*. Third Impression. Illustrated. 6s. net

THE LIFE STORY OF A BADGER

'The charm with which the tale is told will appeal to all. Mr. Tregarthen has the happy gift of imagination; but his artistic sense never allows his fancy to beguile him into the invention of sensational incidents without foundation in fact.' *Field*. Second Impression. Illustrated. 6s. net

THE LIFE STORY OF AN OTTER

'The book is one in which naturalists will especially rejoice, because they will find what cannot be found elsewhere. . . . This speaking description of Western scenery and graphic tale of the most mysterious of its denizens.' *Times*. Illustrated. Third Impression. 6s. net

By RICHARD JEFFERIES

THE GAMEKEEPER AT HOME

SKETCHES OF NATURAL HISTORY AND RURAL LIFE

'Full of natural history sketches not excelled either in style or interest by anything in Waterton or Jesse. A book displaying much knowledge, much love of the subject, and no small amount of literary power.' *News Chronicle*. Eighteenth Impression. With Illustrations by Charles Whymper. 6s. net

THE AMATEUR POACHER

'We have rarely met with a book in which so much that is entertaining is combined with matter of real practical worth. This fascinating and interesting volume is the work of a man of keen and cultured observation.' *The Graphic*. Thirteenth Impression. 6s. net

ROUND ABOUT A GREAT ESTATE

Deals in a fascinating way with life in country villages as it was before the advancing tide of education and enlightenment reached them. Sixth Impression. 6s. net

WILD LIFE IN A SOUTHERN COUNTY

'Marvellous pictures of country sights in England. A volume to be read and re-read, and each time we think with a keener interest.' *The Graphic*. Twelfth Impression. 6s. net

BIRD SYMPHONY

An Anthology compiled by C. C. VYVYAN (C. C. Rogers). A charming anthology for bird-lovers gathered from literature in harmony with bird life and bird song. 6s. net

By DOUGLAS GORDON

DARTMOOR IN ALL ITS MOODS

'It would be hard to overpraise this charming and illuminating book.' *Observer*. With 8 half-tones, four being from water-colours by Lord Gorell. Cheap Edition. 6s. net

FIELD PHILOSOPHY

'I cordially commend it. Packed with practical hints.' *Morning Post*. With 8 Illustrations, seven of which are by Frances Pitt. ~~20s. net~~
Cheap Edition. 5s. net

CHALK STREAMS AND WATER MEADOWS

By E. A. BARTON. 'There are few writers who possess that indefinable charm which can carry one away to the real angler's country. . . . Dr. Barton is one of them.' *The Field*. Illustrated by the Author's own photographs. 7s. 6d. net.

LETTERS TO A SALMON FISHER'S SONS

By A. H. CHAYTOR. 'We are glad to welcome a new edition of one of the best practical books on salmon fishing that has ever been written.' *The Field*. Third (Revised) Edition, with an Appendix, Diagrams and Illustrations. 9s. net

A COTSWOLD VILLAGE

By J. ARTHUR GIBBS. With a Portrait of the Author and other Illustrations. 'It has been a real pleasure to read it' *The Guardian*. Eleventh Impression. Illustrated. 7s. 6d. net

THE WILD SPORTS AND NATURAL HISTORY OF THE HIGHLANDS

By CHARLES ST. JOHN. With Author's Notes. Memoir by the Rev. M. G. Watkins. Illustrated. Tenth Impression. 6s. net

FISHING AND SHOOTING

By SYDNEY BUXTON. With 6 plates in photogravure by Archibald Thorburn. 'He writes in so lucid and charming a manner that we have not often read a book on fishing with greater interest.' *Field*. Fourth (Cheap) Edition. 5s. net

PARTRIDGE DRIVING

By CHARLES E. A. ALINGTON. Some practical hints on increasing and preserving a stock of birds and on bringing them over the guns. Second Edition. With Diagrams. 6s. net

THE HERON OF CASTLE CREEK AND OTHER SKETCHES OF BIRD LIFE

By ALFRED W. REES. With a Memoir of the Author by J. K. Hudson. 'It will be treasured by many a nature lover and its usefulness will not end with one generation.' *Liverpool Post*. With Portrait. Cheap Edition. 3s. 6d. net

NOTES & JOTTINGS FROM ANIMAL LIFE

By FRANK BUCKLAND, M.A. 'A book brimful of anecdote and animal adventures, delightful reading for all times and places.' *Guardian*. With Illustrations. 6s. net

THE GROUSE IN HEALTH AND IN DISEASE

Edited by A. S. LESLIE, assisted by A. E. SHIPLEY, F.R.S. 'Full of very valuable information, both to the Sportsman and the Scientist. It will be a welcome addition to all libraries, whether Sporting or otherwise.' *Field*. Illustrated. 15s. net

BIRD LIFE AND BIRD LORE

By R. BOSWORTH SMITH. 'Mr. R. Bosworth Smith has dealt with a fascinating subject in a fascinating manner. We have at once personal knowledge recorded with thorough sympathy.' *Daily Telegraph*. Illustrated. 6s. net

THE STUDY OF ANIMAL LIFE

By J. ARTHUR THOMSON, M.A., LL.D. 'The book abounds in information, and the author sets it all forth in an easy way. The array of facts is remarkable.' *Nature*. New and thoroughly revised Edition. Illustrated. 6s. net

DOG BREAKING

By General W. N. HUTCHINSON. The most expeditious, certain and easy method. With odds and ends for those who love the dog and gun. Popular Edition. Illustrated. 7s. 6d. net

FIELD PATHS AND GREEN LANES IN SURREY AND SUSSEX

By LOUIS J. JENNINGS. This will be interesting to those who find an unfailing source of pleasure in an ancient church or homestead, a grand old tree or a wild flower under a hedge. Fifth Edition. Illustrated. 6s. net

JOHN MURRAY, Albemarle Street, LONDON, W. 1

AIDE-de-CAMP'S LIBRARY

Accn. No.....

1. Books may be retained for a period not exceeding fifteen days.